CLEAN DEVELOPMENT MECHANISM
SMALL-SCALE PROGRAMME OF ACTIVITIES DESIGN DOCUMENT FORM
(CDM-SSC-PoA-DD) Version 01

CONTENTS

Annexes

NOTE:

(i) This form is for the submission of a CDM PoA whose CPAs apply a small scale approved methodology.

(ii) At the time of requesting registration this form must be accompanied by a CDM-SSC-CPA-DD form that has been specified for the proposed PoA, as well as by one completed CDM-SSC-CPA-DD (using a real case).

SECTION A. General description of small-scale programme of activities (PoA)

A.1 Title of the small-scale programme of activities (PoA):

Composting and Co-composting Programme of Activities (PoA) in Indonesia

Version 4
Date: 9 August 2011

A.2. Description of the small-scale programme of activities (PoA):

1. General operating and implementing framework of PoA

The "Composting and Co-composting Programme of Activities in Indonesia", later on referred to as the "Composting PoA Indonesia", will include small-scale project activities that conduct aerobic digestion of solid and liquid organic waste at palm oil mills to avoid methane emissions from anaerobic digestion of (i) empty fruit bunches (EFB) that are currently disposed of and left to decay in unmanaged solid waste disposal sites situated in the oil palm plantation area and (ii) palm oil mill effluent (POME) that currently tends to be treated in a series of ponds. As described in Section E.4 the treatment of liquid organic waste is optional. Aerobic digestion of solids alone is typically referred to as "composting" whereas the joint digestion of liquids and solids is called "co-composting"[1]. Below and unless otherwise specified the term "composting" will be used to denote both sets of activities.

With the CPO production of 21.5 million tons per year in 2009, Indonesia has become the world's largest producer of palm oil. There were about 608 palm oil mills[2] are operating in Indonesia with capacity ranging from 5 to 120 tons FFB/hour and will continue to be added along with the extension of palm oil plantation and to fulfil need of CPO world. Apart of the high production, palm oil mill (POM) practices and palm waste management in Indonesia have not been changed much for nearly 30 years.

In the process of producing crude palm oil (CPO), a palm oil mill produces many type of wastes such as EFB, fibers, palm kernel shells (PKS), and liquid waste known as palm oil mill effluent (POME). Whilst fibers and shells are usually burnt on site to meet the heat and electricity requirement of the mill, EFB are usually land applied or dumped and left to decay in unmanaged solid waste disposal site and POME is usually treated in a series of anaerobic ponds to digest the high amount of COD and later further reduce the COD to a level acceptable to the local environmental regulations before final discharge. The above EFB and POME treatment process results in the formation of a large quantity of methane gas released in an uncontrolled manner into the atmosphere. For most mills EFB and POME are still considered as unwanted waste mainly because of their storage, distribution and treatment costs. Composting is a possible way to transform the bulky bunches into a valuable, manageable product for use in the plantation or sold to the market. Compost produced can be used to replace the use of mineral fertilizer. Currently only few palm oil mills that have been applying composting or co-composting project for the waste management. Implementation of a composting project will require substantial investment costs. The only

[1] Frank Schuhardt, Klaus Wulfert and Tjahono Herawan, "Protect the environment and make profit from the waste in palm oil industry".

[2] Dewan Minyak Sawit Indonesia (Indonesian Palm Oil Board), 2010 Report

income would be the cost saving from the reduced usage of chemical fertilizer due to utilization of compost product. Compost produced will be difficult to be sold, as currently there is no market for compost from palm oil waste in Indonesia. On the other hand, the Indonesian Government give the subsidized prices of the chemical fertilizer to the smallholders.

The PoA will consist of CDM Programme activities (CPAs) that each represents one composting project located at one palm oil mill.

2. Policy/measure or stated goal of the PoA

The objective of the Composting PoA Indonesia is to develop a platform for supporting the development of composting and co-composting plants in Indonesia in order to reduce organic waste and associated pollution generated by palm oil mills. To reach this goal the coordinating entity will provide the following services across the country:

- raise awareness among palm oil mill owners of climate change and the emissions associated with the processing of EFB and POME. Awareness will also be raised concerning the potential to reduce greenhouse gas emissions and opportunities for generating CDM revenues. To this end the coordinating entity will conduct capacity building sessions across Indonesia that explain the CDM and support palm oil mill owners in integrating CDM into their composting projects in order to improve the financial viability of such projects.
- provide standardized and streamlined access to CDM services for the composting and co-composting projects in Indonesia. To this end the coordinating entity will coordinate the inclusion of the CPA in the PoA, provide monitoring and verification services to all CPAs, and support the effective commercialization of CERs. Over time additional services will be added to support the effective development of composting projects in the palm oil sector across Indonesia.

The contribution of the Composting PoA Indonesia to sustainable development is significant assessed by using the sustainable development criteria of Indonesia[3].

Environmental sustainability

- Composting PoA Indonesia encourages the full utilization of biomass (EFB) and waste water (POME) to produce high-value compost that can be applied in the plantations, thus reducing the demand for mineral fertilizer, thus lowering energy use and pollution associated with the production of the latter.
- As a composting project activity, CPAs will reduce the uncontrolled emissions of methane from decay of EFB in the unmanaged solid waste disposal site and – in the case of co-composting projects – the uncontrolled emissions of methane from POME in the open lagoon wastewater treatment system and, both of which would have contributed to global warming;
- Each CPA that co-composts POME will also contribute to reducing odours and possible health hazard which would have been generated using only open anaerobic lagoon for POME treatment; thus minimizing pollution to the environment;
- Each CPA that co-composts POME will reduce water pollution from current discharging of treated POME to the river and support zero-waste, zero discharge systems;
- No additional resources (e.g. water) will be used for the composting process, as the humidity required will be provided by the POME.

Economic sustainability

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[3] Indonesian DNA website, http://dna-cdm.menlh.go.id/en/susdev/, retrieved on October 10th, 2008.

- Each CPA will contribute to the employment by providing opportunity of new jobs for local community starting from construction to commissioning later on in operation and maintenance of the plant[4];
- Each CPA will produce organic fertilizer (compost) that will partly replace the existing use of purchased chemical or organic fertilizer;

Social sustainability
- Each CPA will act as a clean technology demonstration project and will encourage the other industries to come up with the similar project;
- Involvement of local communities through a public participation meeting, in which people accepted the project;
- Provision of staff training to improve their technical skills.

Technology sustainability
- The PoA supports the utilization of advanced co-composting and composting technologies from abroad;
- Each CPA will provide an opportunity for local people to acquire know-how for the optimal maintenance and operation of state-of-the-art co-composting or composting plant, as the case may be.
- Each CPA will contribute to provide opportunity of technology transfer.

3. Confirmation that the proposed PoA is a voluntary action by the coordinating/managing entity

The Composting PoA Indonesia is a voluntary action being coordinated and managed by PT. Composting Program International (PT.CPI). There are no mandatory laws or regulations in Indonesia that require the treatment of palm oil mill wastes through composting or co-composting.

A.3. Coordinating/managing entity and participants of SSC-POA:

The following information shall be included here:
1. Coordinating or managing entity of the PoA as the entity which communicates with the Board

PT.CPI will be the Coordinating/Managing Entity[5] for the CDM programme activities under the Programme of Activities (PoA) and communicate with the CDM Executive Board.

2. Project participants being registered in relation to the PoA. Project participants may or may not be involved in one of the CPAs related to the PoA.

Name of Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Indonesia (host)	PT. Composting Program International (PT.CPI)	No
Switzerland	South Pole Carbon Asset	No

[4] The employment creation will be detailed at CPA level.

[5] The Coordinating/Managing Entity shall be a project participant authorized by all participating host country DNAs involved and identified in the modalities of communication as the entity which communicates with the Executive Board, including on matters relating to the distribution of CERs.

	Management Ltd.	

A.4. Technical description of the small-scale programme of activities:

Most of the palm oil mills in Indonesia use conventional technology which produce much solid and liquid waste with minimal treatment and utilization. A palm oil mill produces a large amount of solid/biomass waste and palm oil mill effluent (POME). Solid wastes with high organic matter are fiber, shell and empty fruit bunch (EFB). Fiber, which is about 13 % of the processed fresh fruit bunch (FFB), is usually used up for fuel in the boiler. Shell (7 % of processed FFB) is also used partly for boiler and the rest is used for road hardening. Empty Fruit Bunch (23 % of processed FFB) is usually dumped and left to decay in unmanaged solid waste disposal site. The amount of POME generated in a POM is about 0.65 m3 per ton of processed FFB which contains high concentration of COD[6]. Among those solid and liquid waste, EFB and POME require much greater attention for their disposal and treatment since otherwise they cause negative impact on the environment including high green house gases (GHG) emission. The global environmental pressures have forced palm oil industry in Indonesia to change the technologies to better and more environmentally friendly ones. This change will not only improve the efficiency of the process but also reduce GHG emission. At present very few composting or co-composting activity of wastes from palm oil mill in Indonesia. This PoA would support the development of composting and co-composting plants in palm oil mill sector in Indonesia. The programme would also generate local employment and help the country develop in an environmentally friendly and sustainable way.

Technology to be employed for the programme is the aerobic composting. Aerobic composting is the controlled biological decomposition of organic materials under aerobic conditions and requires the presence of oxygen, which is an important factor in the process.

The aerobic composting process produces a valuable compost product from a solid waste material EFB that would otherwise have been placed in a landfill and a wastewater (POME) that would otherwise have been placed in a series of open lagoon system which generated large quantities of methane.

A.4.1. Location of the programme of activities:

The PoA covers the geographical region of Indonesia.

A.4.1.1. Host Party(ies):

Republic of Indonesia.

A.4.1.2. Physical/ Geographical boundary:

Definition of the boundary for the PoA in terms of a geographical area (e.g., municipality, region within a country, country or several countries) within which all small-scale CDM programme activities (SSC-CPAs) included in the PoA will be implemented, taking into consideration the requirement that all

[6] Frank Schuchardt, D. Darnoko, Purboyo Guritno, “Composting of Empty Fruit Bunch (EFB) with Simultaneous Evaporation of Oil Mill Waste Water (POME)”.

applicable national and/or sectoral policies and regulations of each host country within that chosen boundary;

The proposed PoA will be developed within one country only, Indonesia. The location of which the CPAs will be implemented is between the latitude of 6.0000° N to 11.0000° S and the longitude of 97.0000° E to 141.0000° E.

A map[7] indicating the location of the PoA is provided below.

Figure 1: The map of Indonesia

A.4.2. Description of a typical small-scale CDM programme activity (CPA):

The typical CDM programme activity (CPA) under this PoA shall lead to reduction of GHG emission through aerobic composting of EFB or co-composting of EFB and POME in different palm oil mills in Indonesia.

The methodology applicable for the project activity according to the UNFCCC's published simplified procedures for small-scale activities is AMS III-F *Avoidance of methane emission through controlled biological treatment of biomass, version 08*. This project falls under sectoral scope 13, waste handling and disposal. The project conforms to the project category since the annual emission reduction would be less than or equal to 60 kt of CO_2 equivalent.

The PoA will support the change of the conventional way of waste management in palm oil mills to aerobic composting or co-composting technology. The typical CPA consists in the construction and operation of a composting (only EFB) or co-composting (EFB and POME) facility conducted at one palm

[7] http://www.state.gov/r/pa/ei/bgn/2748.htm

oil mill facility. The wastes of EFB from disposal site and wastes of POME from a series of open lagoon system would be transported to the compost facilities, which is constructed adjacent to the palm oil mill. The incoming waste would be aerobically composted and the compost produced would be applied in own plantation or be sold to the market. The organic components of the waste would not be landfilled subsequent to the implementation of the Program of Activities and the potential methane generation from the landfills would be avoided.

Each CPA will be located in the palm oil mill vicinity and identified through latitude and longitude of the location of the composting plant and palm oil mill.

A.4.2.1. Technology or measures to be employed by the SSC-CPA:

Composting is a process of controlled biological decomposition of organic materials in an aerobic process and requires the presence of oxygen, which is an important factor in the process. Under the presence of oxygen, microorganisms, including bacteria and fungi, break down organic matter. The effectiveness of the composting process is influenced by the environmental conditions present within the compost (temperature, moisture, organic matter, oxygen and the size and activity of microbial populations). The composting activity requires aeration as well as strict control of key parameters – oxygen levels at the bottom of the compost mounds, temperature and humidity inside compost – to ensure that the process proceeds under optimal conditions.

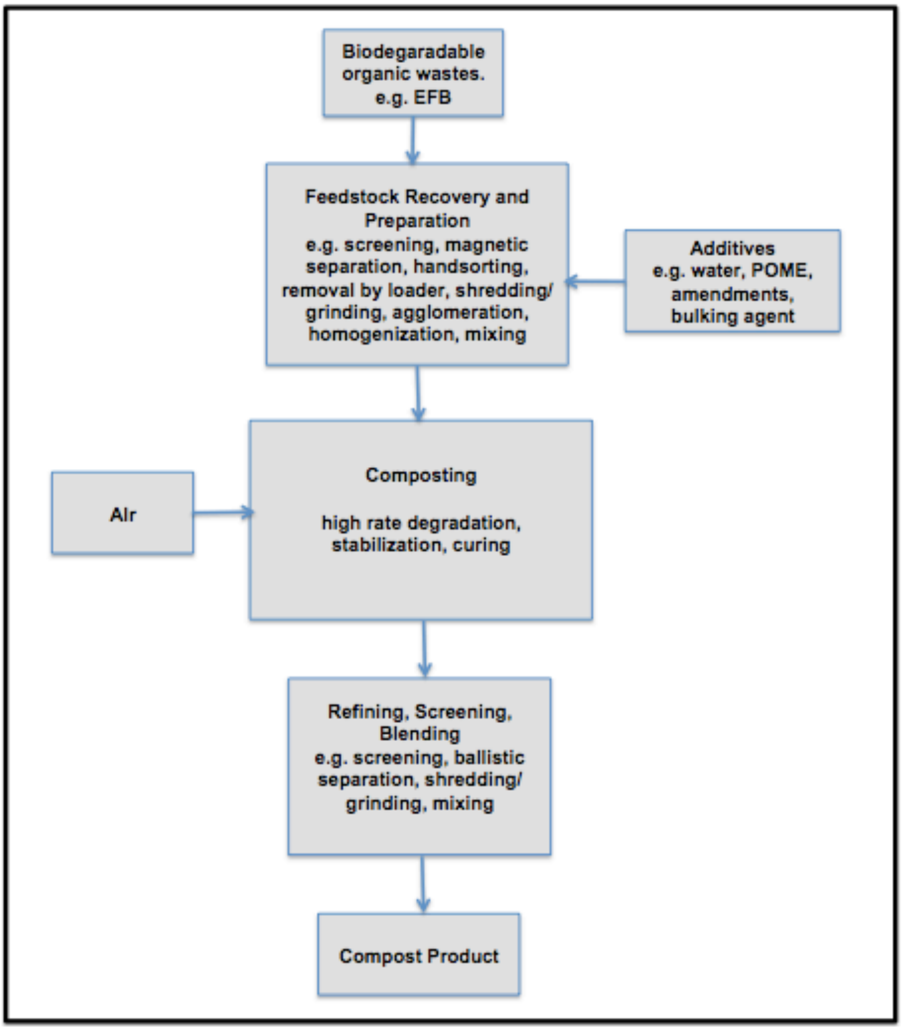
Co-composting involves the joint composting of solid and liquid wastes. The addition of POME can speed up the composting process by reducing the C/N ratio. Co-composting of EFB and POME is the optimal solution to unify all nutrients in one product. Successful co-composting projects will apply zero-discharge and zero-waste technology and increases the reuse of the palm oil mill's waste. The compost generated by composting and co-composting processes constitutes an excellent fertilizer and will improve the soil-conditioning value in the plantations by increasing the latter's organic matter content[8]. Under this PoA, EFB will be composted alone or together with POME to utilize organic waste generated by a typical palm oil mill.

The composting facility comprises several stations or sections that each handles a different process. The pre-composting area handles the incoming feedstock; the composting area handles the composting process itself, while the post-composting area handles the materials after composting up to the stage of the final product. Though detailed technical characteristics will differ across CPAs, a typical composting or co-composting facility will comprise composting pads (e.g. in form of concrete floor), a shredder/grinder, a mixer, aeration (e.g. turning machine), loader, dump trucks, a piping system, and monitoring equipment.

The process involved in composting and co-composting facilities is summarized in the figure below.

[8] Utah State University, AG-WM 01 "*The Composting Process*", October 1995.

Figure 2: Processing steps in a composting or co-composting facility



Several different processes and technologies exist for composting and co-composting. They differ mainly by whether the high-rate degradation of organic matter takes place outside in the open air (a so-called "non-reactor system"), in an enclosed building ("enclosed reactor system"), or in an "in-vessel reactor system". The most commonly used processes are:

1. Non-Reactor Systems:
   - Windrow Composting
   - Static pile Composting

2. Enclosed Reactor Systems:
   - Channel, Cell and Windrow Composting
   - Aerated Pile Composting with Automatic Turning Machines
   - Brikollari Composting

3. In-Vessel Reactor Systems:
   - Tunnel Composting

- Box and Container Composting
- Rotating Drum Composting
- Vertical Flow Composting

Each of these technologies and other variants that may be developed in coming years are eligible for CPAs to be included in this PoA, provided they meet the eligibility requirements outlined below. The project technology will not get substituted by other or more efficient technologies within the project period. Only the equipment, when needed (for instance when the old equipment is out of order), will be eventually replaced by more recent equipment available at that time.

The palm oil mills implementing the CPA do not have previous experience with the operation of an aerated composting plant (as per eligibility criteria, no composting activity must have previously occurred at CPA site), and will require new skills and know-how for its proper operation. Currently, most of the composting technologies used in the host country come from abroad from Annex-I countries but also come from non Annex-I countries. The palm oil mill implementing the CPA is required to organize training for its staff that will operate and maintain the machinery. The training includes preventative maintenance, repair, overhaul, et cetera, and will be usually organized in collaboration with the machine suppliers. Additionally, training on compost production management is required. The technology provider that has designed this composting system usually provides the training and supervises the composting production during the commissioning of this plant, in order to guarantee that compost production and data gathering, recording, and filing required to ensure CER generation will all be done correctly.

A.4.2.2. Eligibility criteria for inclusion of a SSC-CPA in the PoA:

Here only a description of criteria for enrolling the CPA shall be described, the criteria for demonstrating additionality of CPA shall be described in section E.5

A CPA to be included in the proposed PoA shall fulfill the following conditions:

i. CPA consists of only one composting or co-composting plant producing compost from palm oil mill waste. Project shall be implemented at Palm Oil Mill site where no composting or co-composting activity was taking place before.
ii. The requirements including applicability criteria of AMS-III.F version 8 will be met by CPA.
iii. An agreement shall be in place between the co-composting project owner (CPA operator) and the Coordinating and Managing Entity (CME), authorizing the CME to include the CPA into the PoA and therefore ceding the carbon rights to the CME.
iv. Prior to CPA implementation; where the EFB is disposed in dumping site, the dumping site must have the capacity to accommodate EFB for the whole crediting period. Where the EFB is burnt or land applied, no baseline emission from solid waste will be claimed.
v. Prior to CPA implementation; POME must be treated in anaerobic ponds without biogas recovery systems.
vi. Only EFB & POME will be composted out of all the palm oil mill residues.
vii. At the time of inclusion of the CPA in the PoA, there is no enforced regulation in Indonesia that prohibits the current disposal of EFB in an unmanaged solid waste disposal site / landfilling and (for co-composting CPAs) there is no regulation to require the recovery of methane from anaerobic ponds treating POME.
viii. Residual waste or compost produced under the project activity shall not be stored under anaerobic conditions.
ix. The maximum distance for transporting EFB and POME for the composting process by the CPA is 200km.

x. CPA must be in compliance with all laws and regulations of Indonesia.
xi. The CPA Operator shall demonstrate that this project activity shall not lead to double counting of Emission Reduction by confirming that this project activity shall not be a part of any of the below mentioned category post approval of the project activity under CDM: (1) Standalone CDM project activity, (2) Bundled CDM project activity, (3) Another registered PoA.
xii. The Proposed CPA shall demonstrate the compliance with the EB 54 Annex 13 "Guidelines on assessment of de-bundling for SSC project activities". The CPA is considered as debundled if both conditions (a) and (b) below are satisfied:
   a. Has the same activity implementer as the proposed small scale CPA or has a coordinating or managing entity, which also manages a large scale PoA of the same technology/measure, and;
   b. The boundary is within 1 km of the boundary of the proposed small-scale CPA at the closest point.

A.4.3. Description of how the anthropogenic emissions of GHG by sources are reduced by a SSC-CPA below those that would have occurred in the absence of the registered PoA (assessment and demonstration of additionality):

The following table provides a timeline of the PoA implementation. PoA idea arose in early 2008 when South Pole and EcoSecurities entered negotiations about taking over some of EcoSecurities' projects. Inspired by the Hydropower PoA, which South Pole had just started in cooperation with GTZ, South Pole proposed to take over the entire pipeline of composting and co-composting projects from EcoSecurities, and manage them as a Programme of Activities. At Carbon Expo 2008 (May), the discussions between EcoSecurities and South Pole were intensified, and in June 2008 decision to commit internal resources to develop the PoA. This is the first real action undertaken for this PoA and is considered as project start date of the PoA. In parallel South Pole started to approach the composting projects that EcoSecurities was terminating. For instance, the agreement with Fetty Mina Jaya, project chosen as first CPA of the PoA was signed on 6 November 2008. Following this agreement project implementation of this first CPA could start. The agreement between EcoSecurities and South Pole was finally signed later in May 26, 2009.

Event	Date
Preliminary discussion between EcoSecurities and South Pole about takeover some of EcoSecurities' projects.	March 2008
South Pole board decision to undertake a composting PoA in Indonesia (project start date of the PoA)	9 June 2008
Termination of Fetty Mina co-composting project validation by EcoSecurities	16 October 2008
Termsheet between Fetty Mina Jaya and South Pole	6 November 2008
Novation agreement signed between South Pole and EcoSecurities for several co-composting projects	26 May 2009
A PoA consultation is held in Jakarta	15 December 2009
PoA documentation is uploaded to the UNFCCC server for public comments	22 December 2009
Validation site visit	15-19 February 2010
PT. CPI is incorporated as per Indonesian regulations	24 August 2010
Registration	30 September 2011

	(Projected)

The following information presents the demonstration of additionality of the PoA as a whole while information regarding the additionality of each CPA will be presented in section E.5:

(i) The proposed PoA is a voluntary coordinated action

The proposed PoA is a voluntary and coordinated action, which will develop capacity among palm oil mill owners, coordinate palm oil mills across Indonesia to encourage the composting of solid and liquid waste, and seek carbon finance services. In doing so the PoA will encourage sustainable waste management in the palm oil sector. Among all laws and regulations linked to waste treatment in the palm oil sector in Indonesia[9], there are no mandatory laws or regulations in Indonesia stipulating the composting of organic waste generated by palm oil mills or recourse to carbon finance for the development of such composting projects.

(ii) If the PoA is implementing a voluntary coordinated action, it would not be implemented in the absence of the PoA;

In Indonesia, chemical fertilizers are heavily subsidized by the government and can be thus purchased at very low prices. Subsidy for fertilizer always increased every year. Only in 2010 the subsidy is reduced with aim to minimize the misuse of subsidized products due to large gap between subsidized fertilizer and real fertilizer price, which would have been paid without subsidy[10]. The only source of revenues of composting plant is the sales of compost as natural fertilizer. But in this very competitive market, it is very difficult for compost to compete with the cheap chemical fertilizers. Compost is not seen as equal replacement to synthetic fertilizer as it releases its nutrients not with immediate effect. For optimized industrialized farming the direct availability of nutrients is requested. Further, the nutrient density of synthetic fertilizer is higher then for compost. Large plantation owner prefer to deal with an effectively proven product at certain quantity and timing for specific plant requirements, and typically chose synthetic fertilizer instead of compost[11]. Since there is no market for compost from palm oil mill waste in Indonesia, the compost price can be calculated using mineral based fertilizer price and based on nutrients composition of the compost produced. From the palm-oil mill point of view, a composting plant does not therefore appear as profitable investment and they tend to go for the least-cost option to treat their solid and liquid wastes which is respectively landfilling and lagooning. The main barrier to composting plants is therefore financial. Thanks to the PoA and the new source of revenue from CER it provides, palm-oil mill producers can overcome the financial barrier and are encouraged to invest in new compost facilities.

As per paragraph 73 of the 47th EB meeting report "additionality is to be demonstrated either at the PoA level or at CPA level". As per EB 60, Annex 26, Paragraph 4, a full additionality assessment in the

[9] Regulation of the State Minister of Environment_No_11_Year_2006, Environmental Impact Assessment; Decree of the State Minister of Environment_No_51_Year_1995, Liquid Waste Standards for Industrial Activities; Government Regulation_No_41_Year_1999, Air Pollution Control; Decree of the State Minister of Environment_No_111_Year_2003, Guidelines of Requirements, Permit Procedures and Study for Wastewater Disposal into Water or Water Resources; Decree of the State Minister of Environment_No_13_Year__1995, Quality Standards for Stationary Source Emission.

[10] Fertilizer Industry, Pefindo Credit Rating Indonesia, Niken Indriarsih

[11] Oral conversation with fertiliser specialist Handri Kusdian, PT. Sri Rejeki Fertilizer,

context of a CPA is not required. Additionality check could rather by checked by means of eligibility critreria. The PPs choose to demonstrate the additionality fully at CPA level by showing that the SSC-CPAs cannot be implemented in the absence of this PoA because of financial barriers as can be seen in the paragraph above. In view of the heterogeneity across composting and co-composting projects in Indonesia, the additionality at CPA level is more appropriate than demonstrating the additionality at PoA level. Indeed, the demonstration of financial barriers will guarantee that every CPA included at any point in time in the PoA would not have occurred in the absence of receiving the benefits from generating carbon credits. This point is further developed in section E.5.2.

(iii) If the PoA is implementing a mandatory policy/regulation, this would/is not enforced;

Not applicable, the proposed PoA itself is a stated goal that is not required by any mandatory policies/regulations in Indonesia.

(iv) If mandatory a policy/regulation is enforced, the PoA will lead to a greater level of enforcement of the existing mandatory policy/regulation.

Not applicable

A.4.4. Operational, management and monitoring plan for the programme of activities (PoA):

A.4.4.1. Operational and management plan:

The proposed PoA involves a range of operational activities in order to implement and manage each CPA by the managing entity PT.CPI and CPA operator within the PoA.

Table 1: Responsibilities under the monitoring plan

Entity	Management Responsibilities and Arrangements
PT.CPI	• Maintain existing relationship with the project owner (e.g. conduct training for data monitoring) • Periodic collect monitoring data • Prepare monitoring reports for emission reduction verification
CPA owner	• Implement composting plant project activity (construction, daily operation, and maintenance of composting plant) • Prepare monitoring data

In addition to the above management tasks, PT.CPI will implement the following operational elements to ensure proper management and oversight of the proposed PoA.

(i) A record keeping system for each CPA under the PoA
In order to unambiguously identify each composting facility participating in the SSC PoA a serial numbering system will be implemented that uniquely identify each facility through numbers for the CPA and the composting facility. This serial numbering system will be used to record baseline and monitoring data on a continuous basis using a MS Excel database. In this way the PoA coordinating entity will be

able to track the emission reduction of each composting facility over the full duration of the crediting period.

Each CPA will follow the record keeping and monitoring requirements stipulated in AMS IIIF version 8. In summary, PT.CPI will record and document CPA detail information as follows:

- Name of the CPA and its project capacity
- The name, address, and project owner details of each participating CPA
- The geographical coordinates of each CPA (GPS coordinates of co-composting facility)
- The record of technical specification of each composting plant participating in the CPA

PT.CPI will be responsible for the management of records and data associated with each CPA. The MS Excel database will be updated manually using the data supplied by the participating composting facilities. It will form the basis for the verification of CPAs and be available for inspection by the DOE at any point in time.

(ii) A system/procedure to avoid double accounting e.g. to avoid the case of including a new CPA that has been already registered either as a CDM project activity or as a CPA of another PoA,

The database described above will be used to perform a double accounting check. Every new CPA will be compared to the already existing database and the list of project activities that are under validation or registered at the UNFCCC. Moreover as shown below, the project implementers will be made aware of the double accounting principle and will certify that the proposed CPA is registered under the Clean Development Mechanism of the UNFCCC or any voluntary scheme

(iii) The SSC-CPA included in the PoA is not a de-bundled component of another CDM programme activity (CPA) or CDM project activity.

The de-bundling check will be performed pursuant to the *Guidelines on Assessment of De-bundling for SSC Project Activities* issued on the EB54 Annex 13 and a small-scale CPA of a PoA shall be deemed to be a de-bundled component of a large-scale activity if there is already an activity, which satisfies both conditions (a) and (b) below:

> (a) Has the same activity implementer as the proposed small scale CPA or has a coordinating or managing entity, which also manages a large scale PoA of the same technology/measure, and;
>
> (b) The boundary is within 1 km of the boundary of the proposed small-scale CPA, at the closest point.

The database described above will be used to perform the de-bundling check. Every new CPA will be compared to the already existing database and the list of project activities under-validation or registered at the UNFCCC. Moreover as shown below, the project implementers will be made aware of the de-bundling rules and will certify that the proposed CPA is not a de-bundled part of a bigger project.

Further discussion of de-bundling is provided in the SSC-CDM-PoA-DD.

(iv) The provisions to ensure that those operating the CPA are aware of and have agreed that their activity is being subscribed to the PoA;

In order to avoid double accounting and to ensure that the operators of the CPA are aware of and have agreed that their activity is being subscribed to the PoA the implementing entity of a CPA shall enter into a contractual arrangement with the coordinating entity including respective provisions that:

- The CPA has not been and will not be registered as a single CDM project activity nor as a CPA under another PoA.
- The implementing entity is aware that the CPA will be subscribed to the present PoA.
- The implementing entity (has not) is not (and will not) undertaking another composting or co-composting project within one kilometre of the proposed CPA.
- The implementing entity cedes its rights to claim and own emission reductions under the Clean Development Mechanism of the UNFCCC or any voluntary scheme to the managing entity of the present PoA.
- The implementing entity certifies that the CPA is not registered under the Clean Development Mechanism of the UNFCCC or any voluntary scheme

Using the unique identification for each participating composting facility, the PoA coordinating entity will confirm that a facility has not already been registered or entered validation as a CDM project activity or as a CPA of another PoA. Should such a case occur then the coordinating entity will not proceed with inclusion of the corresponding CPA in the PoA.

A.4.4.2. Monitoring plan:

(As per footnote 2 of the Annex 38 EB 55, the sampling approach described below is temporary and is valid only until the EB has developed and approved a "guideline containing criteria for determining statistically sound verification techniques and methods")

The coordinating entity will implement a sampling procedure to be used by the DOE during verification. However the coordinating entity wants to keep the option to verify individually some CPAs. The coordinating entity will opt for individual verification of a particular CPA if the implementation of the monitoring plan for this particular CPA has been critical during the monitoring period (this could be the case for instance for the first verification of a CPA). The coordinating entity will submit CPAs for verification by the DOE pursuant to the sequence described below:

1- The coordinating entity will continuously update a list of all CPAs indicating whether they wish to be sampled or verified individually
2- The coordinating entity collects the monitoring information for all CPAs that will be verified and prepares one monitoring report for each CPA.
3- The DOE performs a desk review of all CPAs (sampled and individually verified).
4- The DOE determines the CPAs that belong to the samples
5- The DOE performs the on-site assessments of the CPAs belonging to the sample, if sampling is applied.
6- The DOE computes total verified emission reductions by the PoA

1- Maintenance of a list of verification procedures to be applied to each CPA
The coordinating entity will develop and continuously update a list of CPAs that indicates whether a CPA would like to be individually verified or make use of the sampling modality for verification described below.

2- Collection of monitored parameters and elaboration of the monitoring plan
Each monitoring report will compile all required monitoring information for a CPA (sampled and individually verified) that will be verified by the DOE. This report will unambiguously set out the data

relating to the emission reductions generated by each specific CPA during the monitoring period consistent with the requirements of this SSC-PoA-DD and the corresponding SSC-CPA-DD.

The monitoring plan for parameters included in section E.7.1 will be implemented for each CPA with assistance from the coordinating entity as follows:

- CPA owner will implement each CPA individually and monitor and record all parameters included in section E.7.1.
- The coordinating entity will provide guidance to CPA owner on how monitoring should be conducted and data should be collected in regards to emission reductions calculation.
- The CPA owners will provide data on monitored parameters included in section E.7.1 to the coordinating entity.
- The coordinating entity will document and store all parameters included in section E.7.1 provided by CPA owners in an electronic database, while primary data will be stored by CPA owner
- The coordinating entity review relevant monitoring documents, prepare the monitoring reports of the CPAs, and provide the latter to the DOE.

3- Desk review

The DOE performs a desk review of the monitoring information of all CPAs (sampled and individually verified) as per procedures determined by the CDM Validation and Verification Manual.

At the end of the desk review the coordinating entity shall provide an updated monitoring report elaborated in light of the DOE findings. The DOE approves the final monitoring report provided by the coordinating entity and certifies that (i) the list and type of data collected and provided within the monitoring report is consistent with the monitoring plan of each CPA (ii) ERs are estimated as described in this PoA-DD and the respective CPA-DD and are not miscalculated.

4-Determination of samples

The sampling method is based on the stratified random sample methodology described "General Guidelines for sampling and surveys for small scale CDM project activities", EB50 annex 30. For each stratum a sample will be determined as described further below. The selection of the strata is based on the criteria described the table below:

Table 2: Parameters for determining strata

Item	Justification
GHG sources	The way to determine the project emissions from a Co-composting project differ significantly from composting projects.
GHG sinks	The way to determine the baseline emissions from a Co-composting project differ significantly from composting projects.
GHG reservoirs	N/A
GHG types	Both technologies have the same GHG types
Organizations, facilities, sites	Monitoring plan will differ significantly from composting to co-composting
GHG projects	Same as "GHG sources"
GHG processes	Processes from a Co-composting project differ significantly from composting projects.

By considering the analysis above the sampling categories selected for the verification of this PoA are:

Sampling category	Definition
Stratum I	Composting projects
Stratum II	Co-composting projects

For each stratum the randomly selected samples will be defined as per the Sampling Guidance. The number of CPAs included in a sample for each stratum will be chosen as to meet the maximum margin of error of 10% at a 90% confidence level.

In order to ensure transparency and representativeness of the sample chosen, the CPAs to be included in a sample will be chosen randomly at each verification by the DOE itself. Since the number of CPAs included in the proposed PoA will evolve during the crediting period, the sampling process is to be carried out for each verification.

All CPAs included in a sampling group will be subject to on-site verification pursuant to the guidelines established in this SSC-PoA-DD (see below).

5-Onsite assessments
The DOE performs onsite assessments as per procedures determined by the CDM Validation and Verification Manual of the CPAs to be verified individually and of the randomly selected sample CPAs.

6-Computation of total emission reductions by the PoA
The total verified emissions reductions by the PoA will be the sum of the emissions reductions verified by the sampled and individually verified CPAs. Verified emission reductions generated by the latter type of CPAs will be aggregated in the monitoring report.

For the sampled CPAs, the DOE shall follow the following procedures for computing verified emission reductions for each stratum. These procedures identify the potential types of errors and procedures for how to handle them. The DOE shall report several types of errors identified during the spot checks conducted at CPA level. For each type of error the DOE shall apply the following procedure.

Error type 1-The error is quantifiable:
The error will be conservatively approximated and discounted from the verified ERs.

Error type 2-The error is not quantifiable (other errors)
As a conservative approach the verified ERs from the CPA will be set to 0. The total missing ERs will be counted as an error and treated as follows.

Introducing errors in the final amount of verified ERs
For each sampling group the DOE will determine the absolute uncertainty between the monitored and verified ERs. This absolute error will be discounted for all CPAs from the same stratum.

Finally:

$$error_l = \frac{\sum_k ER_{monitored,l,k}}{\sum_k ER_{verified,l,k}}$$

and

$$ER = \sum_{l,k} ER_{monitoredl,k} \cdot \left(1 - error_l\right) + \sum_j ER_j$$

Where :

ER	Total verified emission reductions to be reported in the verification report (tCO2e)
$error_l$	Error reported by the DOE during onsite assessment of projects of Stratum l in %
$ER_{monitored,l,k}$	Emission reduction of project k from Stratum l as per monitoring report after desk review (tCO2e)
$ER_{verified,l,k}$	Verified emission reduction of project k from Stratum l (tCO2e)
l	Stratum; l = I or II
ER_j	Verified emission reductions of individual verified project j (tCO2e)

A.4.5. Public funding of the programme of activities (PoA):

The PoA does not receive any public funding.

SECTION B. Duration of the programme of activities (PoA)

B.1. Starting date of the programme of activities (PoA):

9 June 2008 (see section A.4.3 for an explanation).

B.2. Length of the programme of activities (PoA):

28 years

SECTION C. Environmental Analysis

C.1. Please indicate the level at which environmental analysis as per requirements of the CDM modalities and procedures is undertaken. Justify the choice of level at which the environmental analysis is undertaken:

1. Environmental Analysis is done at PoA level ☐
2. Environmental Analysis is done at SSC-CPA level ☑

The PoA consists of construction and operation of composting or co-composting facilities in palm oil mills. Due to the site specificity of each CPA, the environmental analysis will be conducted at SSC-CPA level (see Section C3).

C.2. Documentation on the analysis of the environmental impacts, including transboundary impacts:

The analysis of environmental impacts, including transboundary impacts, will be conducted at CPA level.

C.3. Please state whether in accordance with the host Party laws/regulations, an environmental impact assessment is required for a typical CPA, included in the programme of activities (PoA),:

As CPA activities are continuous improvements in the existing environmental management national policies in place at the date of registration of the PoA do not require Environmental Impact Assessments (EIA)[12]. An Environmental Management and Monitoring Plan (EMMP) will need to be developed by the CPAs, as necessary, and submitted to the responsible authorities.

SECTION D. Stakeholders' comments

D.1. Please indicate the level at which local stakeholder comments are invited. Justify the choice:

1. Local stakeholder consultation is done at PoA level ☐
2. Local stakeholder consultation is done at SSC-CPA level ☑

Note: If local stakeholder comments are invited at the PoA level, include information on how comments by local stakeholders were invited, a summary of the comments received and how due account was taken of any comments received, as applicable.

The stakeholder consultation follows the procedures of "CDM Project Approval Mechanism" by the Indonesian CDM National Commission[13].

In the procedures, the project proponent (or together with consultant) prepares application documents that consist of: (i) the National Approval Application Form, which includes explanation about the project proposal's conformability to criteria of Sustainable Development; (ii) Project Design Document; (iii) EIA report (where required); (iv) notes of public consultation; (v) recommendation letter from Ministry of Forestry, only for forestry CDM project proposal, and; (vi) other supporting documents to justify the project. Then the application documents are submitted to the Secretariat to be processed.

Local and focalized impacts of each composting project justify inviting comments from local stakeholders at the CPA level. Stakeholders will *inter alia* be invited to comment if the proposed CPA is expected to have an adverse impact on high value biodiversity areas in the vicinity of the CPA and propose ways in which these can be mitigated. Each SSC-CPA-DD will provide a summary of comments received and describe how due account was taken of any comments received, as applicable.

D.2. Brief description how comments by local stakeholders have been invited and compiled:

Not applicable. Comments from local stakeholders will be invited at CPA level.

D.3. Summary of the comments received:

Not applicable. Comments from local stakeholders will be invited at CPA level.

D.4. Report on how due account was taken of any comments received:

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[12] Government Regulation of PP No. 11/2006 lays out requirements for EIAs.

[13] http://dna-cdm.menlh.go.id/en/approval/

Not applicable. Comments from local stakeholders will be invited at CPA level.

SECTION E. Application of a baseline and monitoring methodology

This section shall demonstrate the application of the baseline and monitoring methodology to a typical SSC-CPA. The information defines the PoA specific elements that shall be included in preparing the PoA specific form used to define and include a SSC-CPA in this PoA (PoA specific CDM-SSC-CPA-DD).

E.1. Title and reference of the approved SSC baseline and monitoring methodology applied to a SSC-CPA included in the PoA:

Referring to the UNFCCC CDM web-site, as per appendix B to the simplified modalities & procedures for small scale project activities type and category applicable to this PoA project activity are:

Sectoral scope : 13
Type : Type III: Other Project Activity
Category : AMS-III.F version 08, *"Avoidance of methane emissions through controlled biological treatment of biomass"*.

The project will also utilize "*Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site*" version 5.01.

E.2. Justification of the choice of the methodology and why it is applicable to a SSC-CPA:

NOTE: In the case of CPAs which individually do not exceed the SSC threshold, SSC methodologies may be used once they have first been reviewed and, as needed, revised to account for leakage in the context of a SSC-CPA.

Measures are limited to those that result in emission reductions of less than or equal to 60 kt CO_2e annually.

Table 3: Applicability of AMS-III.F.v8

The applicability criteria of AMS III.F.v8	Methodology AMS III.F.v8 is applicable to a CPA because:
1. This methodology comprises measures to avoid the emissions of methane to the atmosphere from biomass or other organic matter that would have otherwise been left to decay anaerobically in a solid waste disposal site (SWDS), or in an animal waste management system (AWMS). In the project activity, controlled biological treatment of biomass is introduced through one, or a combination, of the following measures: (a) aerobic treatment by composting and proper soil application of the compost. (b) Anaerobic digestion in closed reactors equipped	1. A CPA avoids emissions of methane to the atmosphere or other organic matter that would have otherwise been left to decay anaerobically in a solid waste disposal site (SWDS) through aerobic treatment by composting and proper soil application of the compost. Hence, option (a) is applicable to all CPAs. Option (b), anaerobic digestion in closed reactors equipped with biogas recovery and combusting/flaring system, is not be applicable to any CPAs.

with biogas recovery and combustion/flaring system.	
2. The project activity does not recover or combust landfill gas from the disposal site (unlike III G) and does not undertake controlled combustion of the waste that is not treated biologically in a first step (unlike AMS III.E). Project activities that recover biogas from wastewater treatment shall use methodology AMS-III.H.	2. The PoA is limited to composting and co-composting activities. There is no LFG capture and flaring nor combustion activities nor biogas recovery from wastewater treatment involved in this PoA.
3. Measures are limited to those that result in emission reductions of less than or equal to 60 kt CO_2e annually	3. A CPA will not reduce more than 60 kt CO_2e annually.
4. This methodology is applicable to the treatment of the organic fraction of municipal solid waste and biomass waste from agricultural or agro- industrial activities including manure. Project activities involving anaerobic digestion and biogas recovery from manure shall apply AMS-III.D or AMS-III.R.	4. The PoA is limited to waste from palm oil mill. A CPA does not consist in animal waste treatment.
5. This methodology includes construction and expansion of treatment facilities as well as activities that increase capacity utilization at an existing facility. For project activities that increase capacity utilization at existing facilities, project participant(s) shall demonstrate that special efforts are made to increase the capacity utilization, that the existing facility meets all applicable laws and regulations and that the existing facility is not included in a separate CDM project activity. The special efforts should be identified and described.	5. Not applicable because the PoA is limited to newly developed composting or co-composting plant. At Palm Oil Mill site, no composting activity must have been undertaken before CPA starts.
6. This methodology is also applicable for co-treating wastewater and solid biomass waste, where wastewater (Palm Oil Mill Effluent, POME) would otherwise have been treated in an anaerobic wastewater treatment system without biogas recovery.	6. A CPA might contain a component applying co-treating POME and Empty Fruit Bunch (EFB), where wastewater would otherwise have been treated in an anaerobic wastewater treatment system without biogas recovery. The wastewater will be used as a source of moisture and nutrient to the composting of solid waste.
7. The location and characteristics of the disposal site of the biomass in the baseline condition shall be known, in such a way as to allow the estimation of its methane emissions. Guidance in paragraphs 4, 6 and 7 in AMS III.E shall be followed in this regard.	7. PoA is limited to palm oil mill where the EFB is disposed in dumping site. The dumping site will be therefore identifiable at CPA inclusion for the determination of the baseline condition.
8. The following requirement shall be checked ex-ante at the beginning of each crediting period in the case of composting of solid waste (EFB): ▪ Establish that identified landfill(s) can be expected to accommodate the waste to be used for the project activity for the duration of the crediting period; or	8. The landfill will be able to accommodate the solid waste (EFB) during the whole crediting period. It is common practice in the region of the CPA to dispose off the waste in solid waste disposal site (landfill).

▪ Establish that it is common practice in the region to dispose off the waste in solid waste disposal site (landfill).	
9. The project participants shall clearly define the geographical boundary of the region and document it in the CDM-PDD. In defining the geographical boundary of the region, project participants should take the usual distances for transporting the waste utilized by the project activity into account, i.e., if waste is transported up to 50 km, the region may cover a radius of 50 km around the project activity. In any case, the region should cover a reasonable radius around the project activity that can be justified with reference to the project circumstances but in no case it shall be more than 200 km. Once defined, the region should not be changed during the crediting period(s).	9. The composting facility is located adjacent to the Palm Oil Mill, providing POME/EFB, and hence cover a boundary of less then 200 km.
10. In the case of stockpiles of wastes baseline emission calculations as described in the “Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site” version 5.01 shall be adjusted. Stockpiles can be characterised as waste disposal sites that consist of wastes of a homogenous nature with similar origin (e.g., rice husk, empty fruit bunches of oil palm, sawmill waste, etc.). Paragraph 22 in AMS III.E vs.16 provides specific instructions for the calculation of baseline emissions where the baseline is stockpiling of the waste.	10. In the case of stockpiles of EFB in the CPA, the calculation of baseline emissions where the baseline is stockpiling of the waste, it will be referred to paragraph 22 in methodology AMS III.E vs.16.
11. Where in the baseline usually there is a reduction in the amount of waste through regular open burning or removal for other applications, the use of the “Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site” version 5.01 shall be adjusted to take account of this burning or removal in order to estimate correctly the baseline emission.	11. In the case of open burning or removal for other applications in the CPA, the use of the “Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site” 5.01 will be adjusted to take account of this burning or removal in order to estimate correctly the baseline emission.
12. The project activity does not recover or combust methane unlike AMS-III.G. Nevertheless, the location and characteristics of the disposal site in the baseline condition shall be known, in such a way as to allow the estimation of its methane emissions.	12. The PoA is limited to composting and co-composting activities. There are no recovering or combustion activities involved in this PoA. The dumping site will be identifiable at CPA inclusion for the determination of the baseline condition.
13. In case residual waste from the biological treatment (slurry, compost or products from those treatments) are handled aerobically and submitted to soil application, the proper conditions and procedures (not resulting in methane emissions) must be ensured.	13. Compost produced by the project activity will be used for agriculture purpose. This ensures no emission of methane.

14. In case residual waste from the biological treatment (slurry, compost or products from those treatments) are treated thermally/mechanically, the provisions in AMS-III.E related to thermal/mechanical treatment shall be applied.	14. No thermal/mechanical treatment of the biomass is involved in the project activity.
15. In case residual waste from the biological treatment (slurry, compost or products from those treatments) are stored under anaerobic conditions and/or delivered to a landfill, emissions from the residual waste shall to be taken into account and calculated as per the latest version of the "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" version 5.01.	15. No storage under anaerobic conditions and/or no delivery to a landfill of compost produced involved in the project activity.
16. For project activities involving controlled anaerobic digestion and production of biogas, technical measures shall be used (e.g., flared, combusted) to ensure that all biogas produced by the digester is captured and gainfully used or combusted/flared.	16. The PoA does not involve controlled anaerobic digestion and production of biogas.
17. The recovered biogas from anaerobic digestion may also be utilised for the following applications instead of flaring or combustion: (a) Thermal or electrical energy generation directly; or **(B)** Thermal or electrical energy generation after bottling of upgraded biogas; or (c) Thermal or electrical energy generation after upgrading and distribution using one of the following options: (i) Upgrading and injection of biogas into a natural gas distribution grid with no significant transmission constraints; or (ii) Upgrading and transportation of biogas via a dedicated piped network to a group of end users; or (d) Hydrogen production.	17. The PoA does not involve anaerobic digestion
18. If the recovered biogas is used for project activities covered under paragraph 12 (a), that component of the project activity shall use a corresponding category under Type I.	18. The PoA does not involve anaerobic digestion with biogas recovery.
19. If the recovered biogas is used for project activities covered under paragraph 12 (b) or 12 (c) relevant provisions in AMS-III.H related to upgrading of biogas, bottling of biogas, injection of biogas into a natural gas distribution grid and transportation of biogas via a dedicated piped network shall be used.	19. The PoA does not involve anaerobic digestion with biogas recovery.
20. If the recovered biogas is used for project	20. The PoA does not involve anaerobic digestion

activities covered under paragraph 12 (d) that component of the project activity shall use corresponding methodology AMS-III.O.	with biogas recovery.
21. In case the project activity involves the replacement of equipment, and the leakage effect of the use of the replaced equipment in another activity is neglected, because the replaced equipment is scrapped, an independent monitoring of scrapping of replaced equipment needs to be implemented. The monitoring should include a check if the number of project activity equipment distributed by the project and the number of scrapped equipment correspond with each other. For this purpose scrapped equipment should be stored until such correspondence has been checked. The scrapping of replaced equipment should be documented and independently verified.	21. Not applicable because the POA will be limited to newly developed co-composting plant.

E.3. Description of the sources and gases included in the SSC-CPA boundary

As referred to the stipulated project boundary for Type III activities in Appendix B for small-scale project activities, the CPA boundary encompasses the physical, geographical site of the composting plant, as well as the following sites:

(a) Where the solid waste (EFB) would have been disposed and the methane emission occurs in the absence of the CPA
(b) Where the co-composting waste water would have been treated anaerobically in the absence of the CPA (if waste water use is part of the CPA);
(c) Where the treatment of biomass through composting takes place;
(d) Where the soil application of the produced compost takes place;
(e) And the itineraries between (a), (b), (c) and (d), where the transportation of the waste, wastewater or compost occurs.

The CPA boundary is graphically summarized in the figures below. The dashed arrows express the GHG-relevant mass flow of the baseline scenario and the drawn-through arrows express the GHG- relevant mass flow of the CPA. Any deviation from this project boundary will be described in the CPA-DD.

Figure 3: Project boundary

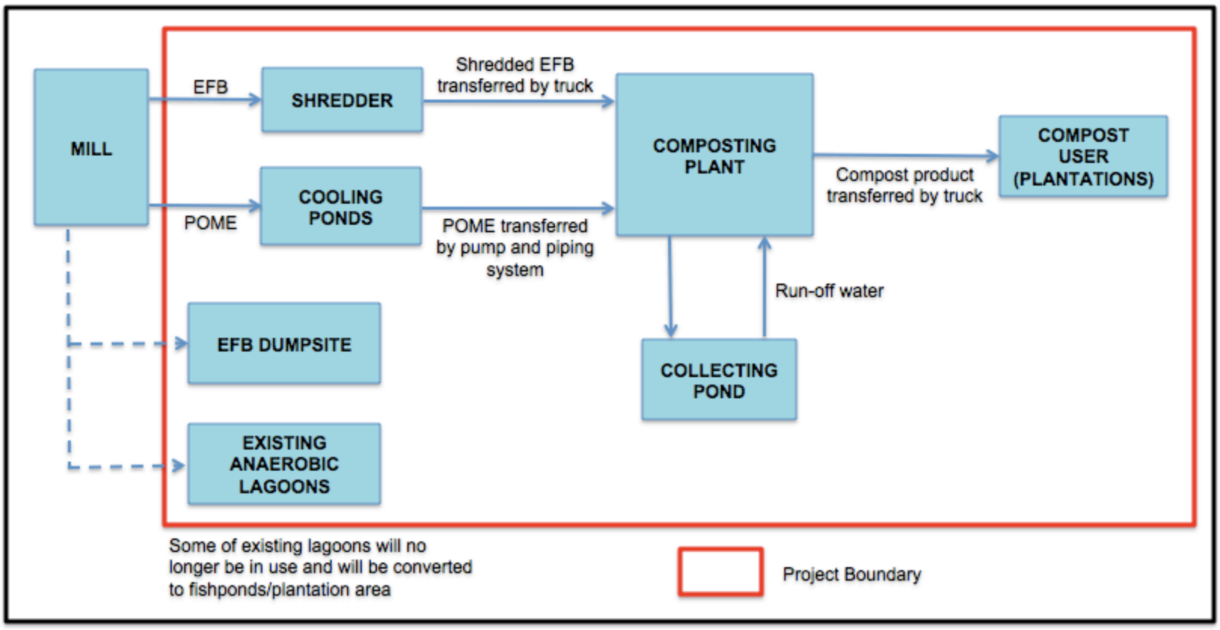

Table 4 - Summary of Gases and Sources included in project boundary

	Source	Gas	Included?	Justification / Explanation
Baseline	Biomass disposed in unmanaged landfill/dumpsite	CO_2	No	CO_2 emissions from biomass decay in solid waste disposal sites are considered GHG neutral
		CH_4	Yes	Methane emission from biomass decay in the solid waste (EFB) disposal site
		N_2O	No	Excluded for simplification and conservativeness. Expected to be minimal
	POME treatment in Open Lagoons	CO_2	No	CO_2 emissions from anaerobic digestion are considered GHG neutral
		CH_4	Yes	Methane emission from anaerobic digestion in open lagoons
		N_2O	No	Excluded for simplification and conservativeness. Expected to be minimal
Project Activity	Composting process	CO_2	No	CO_2 emissions from composting process are considered GHG neutral. Excluded for simplification and conservativeness. Expected to be minimal
		CH_4	Yes	Methane emissions from anaerobic pockets during composting process. This can be set to zero, since the oxygen content of the composting process will be monitored to be above 8%.
		N_2O	No	N_2O emissions from loss of N2O-N during composting process and during application of the compost. Excluded for simplification and conservativeness. Expected to be minimal

	Run-off water	CO_2	No	Excluded for simplification and conservativeness. Expected to be minimal
		CH_4	Yes	Methane emission from run-off of the leakage water that is not re-circulated to the composting plant
		N_2O	No	Not significant, excluded for simplification. Excluded for simplification and conservativeness. Expected to be minimal
	Incremental use of fossil fuel for transportation and auxiliary equipments or machineries due to project activity	CO_2	Yes	CO_2 emissions from combustion of fossil fuel in transport vehicles and machineries
		CH_4	No	Excluded for simplification and conservativeness. Expected to be minimal
		N_2O	No	Excluded for simplification and conservativeness. Expected to be minimal
	Electricity	CO_2	Yes	Use of electricity. Mostly the electricity generated by the biomass power plant and partly from emergency diesel genset or consumed from the electricity grid to run the auxiliary equipments e.g. pumps, lighting, shredder/grinder and mixer.
		CH_4	No	Excluded for simplification and conservativeness. Expected to be minimal
		N_2O	No	Excluded for simplification and conservativeness. Expected to be minimal

E.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

As per paragraph 17 of AMS-III.F version 08: "the baseline scenario is the situation where, in the absence of the project activity, biomass and other organic matter (including manure where applicable) are left to decay within the project boundary and methane is emitted to the atmosphere. The baseline emissions are the amount of methane emitted from the decay of the degradable organic carbon in the biomass solid waste or manure. When wastewater is co-composted, baseline emissions include emissions from wastewater co-composted in the project activity."

For most palm oil mills, EFB and POME are still considered as unwanted waste mainly because of their storage, transport, distribution and treatment costs. Since the prohibition of EFB incineration in Indonesia due to its high pollution, palm oil mills have started to bring EFB back to plantation or just dump them. POME is treated in a system of anaerobic ponds. These waste management systems are widely used in Indonesia and represent the least cost options, does not require any specific skills and can be considered as the baseline scenario of each CPA. If the EFB sent back to plantation for mulching, the baseline scenario from EFB will not be considered and no emission reductions from EFB disposal will be claimed.

As a consequence the baseline scenario of each CPA is identified as the continuation of the actual situation and will be either:

- *For co-composting CPAs:* EFBs are dumped and left to decay anaerobically in unmanaged solid waste disposal site. POME is treated in a series of anaerobic ponds.

- *For composting CPAs:* the baseline scenario is the situation where, in absence of the project activity, EFBs are dumped and left to decay anaerobically in unmanaged solid waste disposal site.

So far there is no regulation in Indonesia that prohibits the current EFB disposal in unmanaged solid waste disposal site/landfilling. In addition, there is no regulation to require the recovery of methane from anaerobic lagoons treating.

In order to retest the validity of the identified baseline scenario, the PPs have added an eligibility criteria to the PoA to check the compliance of the identified baseline scenario with law and regulation from the host country.

E.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the SSC-CPA being included as registered PoA (assessment and demonstration of additionality of SSC-CPA):

E.5.1. Assessment and demonstration of additionality for a typical SSC-CPA:

Here the PPs shall demonstrate, using the procedure provided in the baseline and monitoring methodology applied, additionality of a typical CPA.

Prior consideration of the CDM
The PoA is limited to the two types of projects:

1. CPAs complying with the exception stated in EB report 47, paragraph 72:
   Programmes commencing validation prior to 31 December 2009 may include CPAs with starting date prior to 31 December 2009. Therefore such programmes may include CPAs with a starting date between 22 June 2007 and the commencement of validation of the PoA, if a list of such specific CPAs is provided to validating DOE and UNFCCC secretariat prior to 31 January 2010.
2. CPAs that will be included later on in the PoA but for which the project start date shall be after PoA validation start (22 December 2009).

For project type 1 the following criteria apply as per "Guidance on the Demonstration and Assessment of Prior Consideration of the CDM"[14]:

- For project activities with a starting date on or after 02 August 2008, the project participant must inform a host party DNA and/or the UNFCCC secretariat in writing of the commencement of the project activity and of their intention to seek CDM status. Such notification must be made within six months of the project activity start date.
- For project activities with a start date before 02 August 2008, for which the start date is prior to the date of publication of the PDD for global stakeholder consultation, are required to demonstrate that the CDM was seriously considered in the decision to implement the project activity.

For project type 2 the following criteria apply:

[14] EB 49, Annex 22 was the most recent version of this guidance, which could be applied for CPAs falling under this category (only CPAs with project start date up to commencement of the validation of the PoA, 22, December 2009)

CPAs with start date after the publication of the global stakeholder consultation of the PoA do not have to follow the "Guidelines for the Demonstration and Assessment of Prior Consideration of the CDM" as per EB 60 Annex 26. However the start date shall be clearly defined as per CDM Glossary of Terms.

The limitation of the PoA to these two type of activities will ensure that the CDM has always been considered as per EB guidance.

Additionality
As per attachment A to appendix B to the simplified Modalities & Procedures for small-scale CDM project activities, at least one barrier listed shall be identified due to which the project would not have occurred anyway.

For technologies like composting and co-composting the financial barriers are the main barriers faced by project owners. As the project generates financial benefits other than CDM-related income, benchmark analysis will be used to demonstrate additionality.

As only newly built composting facilities are eligible for participation in this PoA, "non-action from the project proponent(s)" is a credible and realistic alternative to the project scenario. The continuation of the baseline practice in palm oil mills that wish to be included as CPAs in this PoA will require minimal investment or operational costs. Disposal of EFBs in the unmanaged dumpsite only involves transportation and human resource costs, whilst POME is already treated using anaerobic open lagoons without biogas recovery systems. Continuation of this practice would result in minimal ongoing costs for the project host, and would not require any additional capital investment. On the other hand, the construction of a composting plant will require substantial investment costs for equipment, land preparation and construction of the concrete floor.

Therefore the financial viability of the development and operation of each CPA will be compared with a scenario where the CPA owner does not undertake the project ("non-action") and deploys the financial resources that would have been used to finance the construction of the project for alternative investments. To this end and pursuant to version 3 of the Guidelines for the Assessment of Investment Analysis the pre-tax project IRR (without CDM revenues) will be compared with a benchmark rate for investment returns available to the CPA owner in Indonesia[15]. This benchmark represents the minimum pre-tax project IRR that is required for the project to be financially viable relative to the "non-action" scenario.

E.5.2. Key criteria and data for assessing additionality of a SSC-CPA:

Pre-tax project IRR calculation
The pre-tax project IRR will be determined based on a list of economic parameters provided by the CPA owner that were available at the date of the investment decision. This list of parameters includes:

Table 5: Parameters for pre-tax project IRR calculation

PROJECT DATA		
	Unit	**Comments**
Technical lifetime	Year	As per technical lifetime of the main equipment.

[15] The pre-tax IRR is an appropriate indicator for the investment analysis since many palm oil mills and therefore their composting projects are consolidated in the accounts of larger companies. This would make a separate treatment of their tax liabilities in the IRR calculation difficult and favors a pre-tax assessment for the purpose of determine the profitability of the co-composting project solely.

Investment decision date	DD/MM/YY	First payment being made for civil work or equipment or first binding contract being sign for the same.
Annual compost production	t/year	As per feasibility report or as per EFB/Fresh Fruit Bunches ratio, compost/EFB ratio (literature reference) and historical Fresh Fruit Bunch processed (log-book records from the palm-oil mill)
FINANCIAL PARAMETERS		
	Unit	**Comments**
Price of compost	IDR/t	As per contract with compost buyer.
Inflation rate	% per year	If not otherwise specified, annual change in consumer price index at date of investment decision
Exchange Rate	Foreign currency / IDR	Average exchange rate during the twelve months preceding the date of the investment decision
COSTS AND EQUIPMENT		
	Unit	**Comments**
Total investments	IDR	Financial plan sent to bank or contract with technology provider. If the construction is expected to last several years, a yearly breakdown of investments can be provided.
Operation & Maintenance cost	IDR /year	Financial plan sent to bank or contract with techno provider
Insurance	% of Capex p.a.	Can be sourced from e.g. insurance quotation/contract

Assets in a co-composting facility are considered as shredder, truck, turning machine. According to Indonesian accounting standards such assets are depreciated within 8 years. IRR analysis is performed over the period of the technical lifetime or 10 years, whichever is higher. As a consequence, the book value of any project activity assets at the end of the assessment will be considered as zero[16]. After 8 years, the lifetime of the equipment is accounting wise expected to be over. Hence, the realization of the asset is calculated by the value of the asset material (i.e. mainly steel) and the cost of transportation as it is assumed to not function anymore. Due to the remote locations of palm oil mills, transportation costs are considered as fairly high, equalizing or even exceeding the potential revenues from selling the asset (i.e. steel). If small profits or losses would be generated with the realization of the assets, such would affect the overall IRR on a minimal base as it is added in the last year of the IRR analysis period. Hence, the profit on the realization of the assets can be considered as zero.

In Indonesia, US$ and IDR are sometimes applied in financial projections. In order to simplify the analysis all foreign currencies will be converted into IDR using the average exchange rate during the twelve months preceding the date of the investment decision. This will help to avoid all currency bias in the financial analysis.

Source for the main economic parameters shall be extracted from documents provided to banks, equity financers or government. Dates of these documents will also be reported in the SSC CPA-DD. If there is a substantial gap (> 1year) between the date of the investment decision and the date at which the data for the financial analysis has been compiled, total investment and O&M costs (and if applicable subsidies

[16] As per paragraph 4 of Guidance on the Assessment of Investment Analysis (Version 05).

also) will be respectively adjusted according to applicable consumer price indices provided by the Central Bank.

In order to ensure the reliability of the data provided, the coordinating entity will assess and cross check all figures provided by the CPA owners through available data (invoices) or commonly/averaged figures in the specific sector. A standardized excel worksheet has been developed into which data received from the CPA owner will be entered in a transparent manner, and which will in turn compute the project IRR from the pre-tax free cash flow. A template of the said excel sheet has been provided to the DOE for inspection. The table will be used for all CPAs to be included in the PoA. Any changes to this table will be described and explained in the respective CPA-DD.

Benchmark calculation
The financial indicator has been chosen as the project IRR. As per "Guidelines of the Assessment of Investment Analysis" EB 62, Annex 5, paragraph 12, local commercial lending rates can be chosen as default benchmark for this indicator. Alternatively, the weighted average cost of capital (WACC) or any other suitable benchmark can be applied as benchmark as per paragraph 12 of the above mentioned guideline.

In Indonesia average interest rate from commercial bank for investment are compiled by the Central Bank of Indonesia and will be used as a benchmark[17].

Sensitivity analysis
As specified in the excel spreadsheet supplied to the DOE, a sensitivity analysis will be also conducted using assumptions that are conservative from the point of view of analysing additionality, i.e. the "best-case" conditions for the project IRR were assumed by altering the following parameters: (1) project revenues; (2) total investment, and (3) O&M by +/- 10%.

The full results of each sensitivity analysis will be reported in the respective SSC CPA-DD using the following format:

Table 6: Framework for reporting results of sensitivity analysis

	IRR	Variation that hits the benchmark	Likelihood of hitting the benchmark
Total investment -10%			
O&M -10%			
Revenues +10%			

If the IRR exceeds the benchmark while altering one of the 3 parameters, the CPA owner shall provide evidence that this scenario is unlikely to occur. If no sufficient proof is provided, the CPA will be considered as non-additional.

17 http://www.bi.go.id/web/en/Statistik/Statistik+Ekonomi+dan+Keuangan+Indonesia/Versi+HTML/Sektor+Moneter/#

E.6. Estimation of Emission reductions of a CPA:

E.6.1. Explanation of methodological choices, provided in the approved baseline and monitoring methodology applied, selected for a typical SSC-CPA:

The emissions reductions achieved by each CPA are calculated according to the approved methodology AMS III.F Version 08, Scope 13, EB 48 "*Avoidance of methane emission through controlled biological treatment of biomass"*. The emission reductions will be measured as differences between the baseline emissions and sum of the project emission and leakage.

The yearly methane generation potential for the solid waste (EFB) composted by the project is calculated using the first order decay model as described in the "*Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site*" version 5.01.

The yearly methane generation potential for the wastewater (POME) component by the project is calculated by applying equations as stipulated in AMS III.F Version 08.

Project emissions are considered for the incremental transport distance, electricity and/or fossil fuel consumption, during composting process and runoff water. No methane emissions are considered for physical leakages of the anaerobic digester, since no digester is involved in any CPA. And also no methane emissions are considered for anaerobic storage and/or disposal in a landfill of the compost, since the compost product is not stored and/or disposes in a landfill. All compost will be used directly to the plantation or sold to the market.

No leakage emissions will be considered since only projects using new equipments are eligible to the PoA. None of the composting equipments were transferred from or to another project activity and the CPAs are completely new facilities.

E.6.2. Equations, including fixed parametric values, to be used for calculation of emission reductions of a SSC-CPA:

Based on methodology applied, the approved methodology AMS III.F Version 08, Scope 13, EB 48 "*Avoidance of methane emission through controlled biological treatment of biomass"*, the emission reductions achieved by each CPA will be measured as differences between the baseline emissions and sum of the project emission and leakage.

Emission Reduction for a CPA shall be calculated according to the following formula:

$$\mathbf{ER_y = BE_y - (PE_y + LE_y)}$$

Where:

ER_y is the emission reduction in the year "y" (tCO_2e)
BE_y is the total baseline emissions in the year "y" (tCO_2e)
PE_y is the total project emissions in the year "y" (tCO_2e)
LE_y is Leakage emissions in year "y" (tCO_2e)

Baseline Emissions

The baseline emissions are the amount of methane emitted from the decay of the degradable organic carbon in the biomass solid waste (EFB) composted in the CPA. Baseline emissions also include emissions from wastewater co-composted in the CPA. The yearly methane generation potential for the solid waste is calculated using the first order decay model as described in the "*Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site" version 5.01.*

Baseline emissions shall exclude methane emissions that would have to be captured, fuelled or flared to comply with national or local safety requirement or legal regulations.

Baseline emissions will be calculated as:

$BE_y = BE_{CH4,SWDS,y} – (MD_{y,reg}* GWP_{CH4}) + (MEP_{y,ww} * GWP_{CH4}) + BE_{CH4,manure,y}$

Where:

$BE_{CH4,SWDS,y}$	Yearly methane generation potential of the solid waste composted by the project during the years "x" from the beginning of the project activity (x=1) up to the year 'y' estimated as per the latest version of the "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" (tCO2e).
$MD_{y,reg}$	Amount of methane that would have to be captured and combusted in the year 'y' to comply with the prevailing regulations
$MEP_{y,ww}$	Methane emission potential in the year 'y' of the POME wastewater co-composted. The value of this term is zero if co-composting of wastewater is not included in the project activity
$BE_{CH4,manure,y}$	Where applicable, baseline emissions from manure composted by the project activities, as per the procedures of AMS-III.D. The value of this term is zero, since the project does not include treatment of manure.
GWP_{CH4}	GWP for CH_4 (value of 21 is used)

The above baseline emissions will be calculated as follows:

(a) The estimation of the methane emission potential of a solid waste disposal site ($BE_{CH4,SWDS,y}$, in tCO_2e) shall be undertaken using the "*Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site*" version 5.01.

$$BE_{CH4,SWDS,y} = \varphi \cdot (1-f) \cdot GWP_{CH4} \cdot (1-OX) \cdot \frac{16}{12} \cdot F \cdot DOC_f \cdot MCF \cdot \sum_{x=1}^{y} \sum_{j} W_{j,x} \cdot DOC_j \cdot e^{-k_j (y-x)} \cdot \left(1-e^{-k_j}\right)$$

where:

$BE_{CH4,SWDS,y}$	Methane emissions avoided during the year *y* from preventing waste disposal at the solid waste disposal site (SWDS) during the period from the start of the project activity to the end of the year y (tCO2e)
φ	Model correction factor to account for model uncertainties (0.9)
f	Fraction of methane captured at the SWDS and flared, combusted or used in another manner (to be determined in each CPA)
GWP_CH_4	Global warming potential (GWP) of methane, valid for the relevant commitment period
OX	Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the

	soil or other material covering the waste) (to be determined in each CPA)
F	Fraction of methane in the SWDS gas (volume fraction) (0.5)
DOC_f	Fraction of degradable organic carbon (DOC) that can decompose
MCF	Methane correction factor (to be determined in each CPA)
$W_{j,x}$	Amount of organic waste type *j* prevented from disposal in the SWDS in the year *x* (tons)
DOC_j	Fraction of degradable organic carbon (by weight) in the waste type *j*
k_j	Decay rate for the waste type *j*
j	Waste type category (index)
x	Year during the crediting period: x runs from the first year of the first crediting period (x = 1) to the year y for which avoided emissions are calculated (x = y)
y	Year for which methane emissions are calculated

(b) Methane emission potential of co-composted wastewater (POME) is estimated as follows:

$$MEP_{y,ww} = Q_{y,ww,in} * COD_{y,ww,untreated} * B_{o,ww} * MCF_{ww,treatment} * UF_{b,baseline}$$

Where:

$Q_{y,ww,in}$	Volume of POME wastewater entering the co-composting facility in the year "y" (m^3)
$COD_{y,ww,untreated}$	Chemical oxygen demand of the POME wastewater entering the co-composting facility in the year "y" (tonnes/m^3)
$B_{o,ww}$	Methane producing capacity for the wastewater (IPCC default value of 0.21 kg CH_4 / kg COD)
$MCF_{ww,treatment}$	Methane correction factor for the wastewater treatment system in the baseline scenario (MCF value as per table III.F1)
$UF_{b,baseline}$	Model correction factor to account for model uncertainties of co-composted wastewater (0.94)

(c) There are no regulations in Indonesia requiring the capture and utilisation or destruction of methane from EFB disposal sites. There are no regulations in Indonesia that prohibits the current EFB disposal in unmanaged solid waste disposal site/landfilling. In addition, there is no regulation to require the recovery of methane from anaerobic lagoons treating POME.

Therefore, $\mathbf{MD_{y,reg}} = 0$

Project Activity Emissions

Project activity emissions consist of:

(a) CO_2 emissions due to incremental transport distances;
(b) CO2 emissions from electricity and/or fossil fuel consumption by the project activity facilities;
(c) In case of anaerobic digestion: methane emissions from physical leakages of the anaerobic digester;
(d) In case of composting: methane emissions during composting process;
(e) In case of composting (including co-composting of wastewater): methane emissions from runoff water;

(f) In case the residual waste from the biological treatment (slurry, compost or products from those treatments) are stored under anaerobic conditions and/or delivered to a landfill: the methane emissions from the disposal/storage of these residual waste/products.

$PE_y = PE_{y,transp} + PE_{y,power} + PE_{y,\ phy\ leakage} + PE_{y,comp} + PE_{y,runoff} + PE_{y,res\ waste}$

Where:

PE_y	Project activity emissions in the year
$PE_{y,transp}$	Emissions from incremental transportation in the year y (tCO_2e)
$PE_{y,power}$	Emissions from electricity or fossil fuel consumption in the year y (tCO_2e)
$PE_{y,\ phy\ leakage}$	In case of anaerobic digestion: methane emissions from physical leakages of the anaerobic digester in the year y (tCO_2e)
$PE_{y,comp}$	In case of composting: methane emissions during composting process in the year y (tCO_2e)
$PE_{y,runoff}$	In case of composting (including co-composting of wastewater): methane emissions from runoff water in the year y (tCO_2e)
$PE_{y,res\ waste}$	In case the residual waste/slurry/products are subjected to anaerobic storage or disposed in a landfill: methane emissions from the anaerobic decay of the residual waste/products (tCO_2e)

(a) Project emissions due to incremental transport distances ($PE_{y,transp}$)

(i) *The collection points of biomass and the composting site as compared to the baseline solid waste disposal site,*
The composting plant in the CPAs will be located within the palm oil mill vicinity. Hence no incremental transportation for solid biomass waste is required and there are no additional emissions due to incremental transport of solid biomass waste.

(ii) *When applicable, the collection points of wastewater and composting site as compared to the baseline wastewater treatment site,*
The wastewater is transported using a piping system both in the baseline and project activity, which is within the palm oil mill vicinity or close to it. The pumps for the piping system are powered by biomass boiler and steam turbine which is carbon neutral. Thus, there are no increased emissions due to pumping of wastewater in the project activity.

(iii) *The composting site and the soil application sites.*
The compost will be used in the plantation or sold to the market. The compost will be transported on trucks, which incur emissions from combustion of diesel.

The emissions from incremental transportation will be calculated as follows:

$PE_{y,transp} = (Q_y / CT_y) * DAF_w * EF_{CO2} + (Q_{y,comp} / CT_{y,comp}) * DAF_{comp} * EF_{CO2}$

Where:

Q_y	Quantity of waste composted and/or wastewater in the year 'y' (t)
CT_y	Average truck capacity for waste transportation (t/truck)
DAF_w	Average incremental distance for waste transportation (km/truck)
EF_{CO2}	CO_2 emission factor from fuel use due to transportation ($t.CO_2$/km, IPCC default values

	or local values can be used) (0.00047)
$Q_{y,comp}$	Quantity of final compost product produced in the year 'y' (t)
$CT_{y, comp}$	Average truck capacity for final compost product transportation (t/truck)
DAF_{comp}	Average distance for final compost product transportation (km/truck)

IPCC default values will be used for the net calorific value and CO_2 emission factor for diesel fuel.

As explained above, $DAF_w = 0$ and hence:

$$PE_{y,transp} = (Q_{y,comp}/ CT_{y,comp}) * DAF_{comp} * EF_{CO2}$$

(b) Project emissions from electricity and/or fossil fuel consumption by the project activity facilities ($PE_{y,power}$)

$$PE_{y,power} = PE_{gen,y} + \sum PE_{fuel,y}$$

$$PE_{gen,y} = P_{gen,y} \text{ x } OT_{gen,comp,y} \text{ x } 110\% \text{ x } CEF_{gen,y}$$

$$PE_{fuel,i,y} = OT_{machine,i,y} \text{ x } \eta_{machine,i} \text{ x } EF_{fuel}$$

Where:

$PE_{y,power}$	Project emissions from electricity and/or fossil fuel consumption by the project activity facilities ($t.CO_2$/year)
$PE_{gen,y}$	Project emissions from electricity consumption by the project activity facilities ($t.CO_2$/year)
$PE_{fuel,y}$	Project emissions from fossil fuel consumption by the project activity facilities ($t.CO_2$/year)
$P_{gen,y}$	Total capacity of auxiliary equipment installed in the project activity (MW)
$CEF_{gen,y}$	Carbon emissions factor of electricity supplied to the project by the palm-oil mill in year 'y' ($t.CO_2e$/MWh).
$PE_{fuel,y}$	Project emissions from fossil fuel consumption by the project activity facilities ($t.CO_2$/year)
$OT_{machine,i,y}$	Operating hours of composting machine type 'i' in year 'y' (hour/year) (*see values below*)
EF_{fuel}	Emissions factor for the diesel fuel used ($t.CO_2e$/t.fuel) (IPCC 2006)
$\eta_{machine,i}$	Efficiency factor of composting machine type 'i' (t.fuel / hour) (*see values below*)
i	type of composting machines with diesel fuel consumption (loader / skidloader / turning machine)
$OT_{gen,comp,y}$	Operating hours of composting plant when biomass power plant is out of operation (hour/year)

$CEF_{gen,y}$ is determined using the highest applicable value of the following four sources:

1. Technical specifications on fossil fuel use per energy produced multiplied by IPCC 2006 default emission factor
2. Default IPCC 2006 default emission factor on diesel fuelled stationary combustion applying a conservative generator efficiency of 30% (IPCC chapter 2, page 2.16 ff.)
3. Emission factor listed in Table I.D.1 of the methodology AMS I.D
4. Grid emissions factor relevant to the palm oil mill operation (if grid connection is available)

In case of renewable energy sources, $CEF_{gen,y}$ is set zero.

Default values listed, section E.6.3, can be used for the composting machine efficiency or can be taken from machine specification datasheet. There are two types of composting machines, the loader / skidloader and the turning machine, with each diesel fuel consumption rate per hour as follows :

$OT_{machine,loader,y}$	Operating hours of composting machine, loader, in year 'y' (hour/year)
$OT_{machine,turning,y}$	Operating hours of composting machine, turning, in year 'y' (hour/year)
$\eta_{machine,skidloader}$	Efficiency factor of the loader / skidloader machine (t.fuel / hour)
$\eta_{machine,turning}$	Efficiency factor of the turning machine used (t.fuel / hour)

(c) CH_4 emissions from physical leakages of the anaerobic digester
Project emission is set to 0 as no digester is involved in any CPA.

(d) CH_4 emissions during composting.

$$PE_{y,comp} = Q_y * EF_{composting} * GWP_{CH4}$$

Where:

$EF_{composting}$ Emission factor for composting of organic waste ($t.CH_4$/ton.waste treated)
Emission factor can be based on facility/site-specific measurements, country specific values (table 4.1, chapter 4, Volume 5, 2006 IPCC Guidelines for National Greenhouse Gases Inventories). IPCC default values are 10 $g.CH_4$/kg.waste treated on a dry weight basis and 4 $g.CH_4$/kg.waste treated on a wet weight basis. In this case, the waste treated (EFB) is categorized as wet weight basis[18].
In case oxygen content of the composting process is monitored and above 8%, value of $EF_{composting}$ can be set to zero. This can be done via sampling with maximum margin of error of 10% at a 95% confidence level. For this purpose a portable oxygen meter can be used with lancets of at least 1 m length. In the case of forced aerated in-vessel and forced aerated pile composting systems continuous measurements may also be done using online sensors.

(e) CH_4 emissions from run-off water from the composting facilities.

Project emissions from runoff water will be taken into account.

$$PE_{y,runoff} = Q_{y,ww,runoff} * COD_{y,ww,runoff} * B_{o,ww} * MCF_{ww,treatment} * UF_{b,project} * GWP_{CH4}$$

Where:

$Q_{y,ww,runoff}$ Volume of run-off water in the year "y" (m^3)

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[18] Astimar Abdul Aziz, Mohamad Deraman, Ropandi Mamat, Anis Mokhtar, Wan Hasamudin Wan Hasan, Ridzuan Ramli and Ismadi Ismail; High Porosity Carbon Powder from Oil Palm Empty Fruit Bunches for Adsorbent Products, Jurnal MPOB TT No. 332

$COD_{y,ww,runoff}$	Chemical oxygen demand of the runoff water leaving the composting facility in the year “y” (t/m^3)
$B_{o,ww}$	Methane producing capacity of the wastewater (IPCC default value for domestic wastewater of 0.21 kg CH^4/kg. COD)
$MCF_{ww, treatment}$	Methane correction factor for the wastewater treatment system where the runoff water is treated (MCF value as per table III.F1)
GWP_{CH4}	Global Warming Potential (GWP) of methane, valid for the relevant commitment period (21)
$UF_{b, project}$	Model correction factor to account for model uncertainties of project (1.06)

(f) CH_4 emissions from anaerobic storage and/or disposal in a landfill of the compost
Methane emission from anaerobic storage and/or disposal in a landfill of the compost is negligible, since the compost product is not stored and/or dispose in a landfill. All compost will be used directly to the plantation or sell to the market.

Leakage

The technology and machinery for the project activity is not transferred from / to another activity and thus no leakage is considered to take place.

Therefore, **$Leakage_y$ = 0**.

E.6.3. Data and parameters that are to be reported in CDM-SSC-CPA-DD form:

Data / Parameter:	**Bo_{ww}**
Data unit:	$tCH_4/tCOD$
Description:	The methane generation capacity of the wastewater
Source of data used:	AMS-III.F version 8
Value applied:	0.21
Justification of the choice of data or description of measurement methods and procedures actually applied:	IPCC default value for wastewater of 0.21 kg CH4/kg.COD (corrected for uncertainties)
Any comment:	-

Data / Parameter:	**$MCF_{ww,treatment}$**
Data unit:	
Description:	Methane correction factor for the wastewater treatment system in the baseline scenario
Source of data used:	AMS-III.F version 8: Table III.F.1.
Value applied:	To be determined at CPA level based on characteristics of the baseline wastewater
Justification of the choice of data or description of	Values for MCF according to table AMS-III.F version 8: Table III.F.1.

measurement methods and procedures actually applied:	
Any comment:	-

Data / Parameter:	**φ**
Data unit:	-
Description:	Model correction factor to account for model uncertainties
Source of data used:	-
Value applied:	0.9
Justification of the choice of data or description of measurement methods and procedures actually applied:	As per the “Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site” version 5.01
Any comment:	Oonk et al. (1994) have validated several landfill gas models based on 17 realized landfill gas projects. The mean relative error of multi-phase models was assessed to be 18%. Given the uncertainties associated with the model and in order to estimate emission reductions in a conservative manner, a discount of 10% is applied to the model results.

Data / Parameter:	**OX**
Data unit:	-
Description:	Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)
Source of data used:	Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site, version 5.1.0
Value applied:	To be determined of each CPA: - Use 0.1 for managed solid waste disposal sites that are covered with oxidizing material such as soil or compost. - Use 0 for other types of solid waste disposal sites.
Justification of the choice of data or description of measurement methods and procedures actually applied:	Conduct a site visit at the solid waste disposal site in order to assess the type of cover of the solid waste disposal site. Use the IPCC 2006 Guidelines for National Greenhouse Gas Inventories for the choice of the value to be applied. At the renewal of the crediting period, the data should be updated according to default values suggested in the most recently published IPCC Guidelines for National Greenhouse Gas Inventories.
Any comment:	As per the “Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site” version 5.01

Data / Parameter:	**F**
Data unit:	-
Description:	Fraction of methane in the SWDS gas (volume fraction)
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories Volume 3 – Chapter 3.2.3
Value applied:	0.5

Justification of the choice of data or description of measurement methods and procedures actually applied:	As per the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site" version 5.01
Any comment:	This factor reflects the fact that some degradable organic carbon does not degrade, or degrades very slowly, under anaerobic conditions in the SWDS. A default value of 0.5 is recommended by the IPCC.

Data / Parameter:	**DOC_f**
Data unit:	-
Description:	Fraction of degradable organic carbon (DOC) that can decompose
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories Volume 3 – Chapter 3.2.3
Value applied:	0.5
Justification of the choice of data or description of measurement methods and procedures actually applied:	As per the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site" version 5.01
Any comment:	-

Data / Parameter:	**MCF**
Data unit:	-
Description:	Methane correction factor
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories Volume 3 – Table 3.1
Value applied:	To be determined at CPA level based on characteristics of the baseline solid waste disposal site.
Justification of the choice of data or description of measurement methods and procedures actually applied:	Use the following values for MCF: • 1.0 for **anaerobic managed solid waste disposal sites**. These must have controlled placement of waste (i.e., waste directed to specific deposition areas, a degree of control of scavenging and a degree of control of fires) and will include at least one of the following: (i) cover material; (ii) mechanical compacting; or (iii) leveling of the waste; • 0.5 for **semi-aerobic managed solid waste disposal sites**. These must have controlled placement of waste and will include all of the following structures for introducing air to waste layer: (i) permeable cover material; (ii) leachate drainage system; (iii) regulating pondage; and (iv) gas ventilation system; • 0.8 for **unmanaged solid waste disposal sites – deep and/or with high water table**. This comprises all SWDS not meeting the criteria of managed SWDS and which have depths of greater than or equal to 5 meters and/or high water table at near ground level. Latter situation corresponds to filling inland water, such as pond, river or wetland, by waste; • 0.4 for **unmanaged-shallow solid waste disposal sites.** This comprises all SWDS not meeting the criteria of managed SWDS and which have depths of less than 5 metres.

Any comment:	The methane correction factor (MCF) accounts for the fact that unmanaged SWDS produce less methane from a given amount of waste than managed SWDS, because a larger fraction of waste decomposes aerobically in the top layers of unmanaged SWDS.

Data / Parameter:	**DOC_j**
Data unit:	-
Description:	Fraction of degradable organic carbon (by weight) in the waste type j
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories Volume 5 – Tables 2.4 and 2.5
Value applied:	20 %
Justification of the choice of data or description of measurement methods and procedures actually applied:	The figure represents the percentage of wet waste. Processed EFB falls under the category of 'garden, yard and park waste'. As per the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site" version 5.01
Any comment:	See Annex 3 – Baseline Information

Data / Parameter:	**k_j**
Data unit:	-
Description:	Decay rate for the waste type j
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories Volume 5 – Tables 3.3
Value applied:	0.17
Justification of the choice of data or description of measurement methods and procedures actually applied:	As defined in the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site" version 5.01, EFB characteristics are similar to garden waste. Hence correspondent values for garden waste shall be used. Palm oil plantations are grown within the tropical belt with MAT > 20°C and MAP > 1000 mm[19].

Waste type *j*		**Boreal and Temperate (MAT≤20°C)**		**Tropical (MAT>20°C)**	
		Dry (MAP/PET <1)	Wet (MAP/PET >1)	Dry (MAP< 1000mm)	Wet (MAP> 1000mm)
Slowly degrading	Pulp, paper, cardboard (other than sludge), textiles	0.04	0.06	0.045	0.07
	Wood, wood products and straw	0.02	0.03	0.025	0.035
Moderately degrading	Other (non-food) organic putrescible garden and park waste	0.05	0.10	0.065	0.17
Rapidly degrading	Food, food waste, sewage sludge, beverages and tobacco	0.06	0.185	0.085	0.40

Any comment:	-

Data / Parameter:	**EF_{fuel}**
Data unit:	$t.CO_2/t.fuel$
Description:	CO_2 emission factor from diesel use
Source of data used:	IPCC 2006 value.
Value applied:	3.185
Justification of the choice of data or description of measurement methods and procedures actually applied:	Calculated by multiplying the following two values: i) Emission factor for Gas/Diesel oil: 74.10 tCO2/TJ (Source: IPCC 2006, vol2, 2006 - Table 2.2 page 2.16cited at: http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf) ii) NCV for Gas/Diesel oil: 43.33 TJ/10^3 tonnes (Source: Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Workbook cited at http://www.ipcc- nggip.iges.or.jp/public/gl/guidelin/ch1wb1.pdf)
Any comment:	-

Data / Parameter:	**EF_{CO2}**
Data unit:	$t.CO_2/km$
Description:	CO_2 emission factor from diesel fuel use due to transportation
Source of data used:	Calculated based on the following inputs: i) Vehicle Fuel Consumption (volume): 0.175 litres/km ii) Diesel Density: 0.8425 kg/litre iii) CO_2 emission factor from fuel use due to transportation: 3.185 $t.CO_2$ / t.fuel EF_{CO2} can be calculated as: (0.175 * 0.8425) * 3.185 / 1000 = 0.00047
Value applied:	0.00047
Justification of the choice of data or description of measurement methods and procedures actually applied:	i) Vehicle Fuel Consumption (volume): 17.5 litres for 100km used. Source: www.ipcc-nggip.iges.or.jp/public/gp/bgp/2_3_Road_Transport.pdf (table 1-31 page 70) ii) Fuel Density: 0.8425 kg/litre. Source: Pertamina National Oil Company http://www.pertamina.com/index.php?option=com_content&task=view&id=3194&Itemid=667 iii) CO2 emission factor from fuel use due to transportation: IPCC 2006, vol2, 2006 - Table 2.2 page 2.16
Any comment:	-

Data / Parameter:	$\eta_{machine,skidloader}$
Data unit:	t.fuel / hour
Description:	Composting machine efficiency, loader / skidloader (diesel fuel consumption rate per hour)
Source of data used:	Values to be used (unit converted into tonnes using fuel density = 0.8425) : i) Fuel consumption as defined by manufacturer; or ii) 13.6 liter/hour, defined as maximum fuel consumption of loader / skidloader in composting facilities. $\eta_{machine,skidloader}$ can be calculated as: 13.6 x 0.8425 / 1000 = 0.01146
Value applied:	0.01146

Justification of the choice of data or description of measurement methods and procedures actually applied:	i) Highest value for skidloader diesel fuel consumption rate (i.e. model GEHL 5240E = 13.6 litres / hour) Source : www.mwesales.com/Gehl-Specs/3640-4240-4640-5240.pdf ii) Fuel Density: 0.8425 kg/litre. Source: Pertamina National Oil Company http://www.pertamina.com/index.php?option=com_content&task=view&id=3194&Itemid=667
Any comment:	-

Data / Parameter:	$\eta_{machine,turning}$
Data unit:	t.fuel / hour
Description:	Composting machine efficiency, turning machine (diesel fuel consumption rate per hour)
Source of data used:	Values to be used (unit converted into tonnes using fuel density = 0.8425) : 1. Fuel consumption as defined by manufacturer; or 2. Values from below table for different size of turning machine: Turning machine / Fuel consumption, highest / Remarks Small size / 13 liter/hour / Drum width <=4 meter Medium size / 25 liter/hour / Drum width >4-5 meter Large size / 37 liter/hour / Drum width >5-6 meter Very large size / 45 liter/hour / Drum width >6 meter $\eta_{machine,turning}$ can be calculated as: 37 x 0.8425 / 1000 = 0.03117 *(large size)*
Value applied:	0.03117
Justification of the choice of data or description of measurement methods and procedures actually applied:	i) Typical model Backhus 17.50 turning machine fuel consumption (volume): 37 litres / hour Source : http://www.organics-recycling.org.uk/uploads/article1762/Materials%20Handling%20Equipment%20Guide.pdf ii) Fuel Density: 0.8425 kg/litre. Source: Pertamina National Oil Company http://www.pertamina.com/index.php?option=com_content&task=view&id=3194&Itemid=667
Any comment:	-

Data / Parameter:	$\mathbf{CEF}_{gen,y}$
Data unit:	tCO2e/MWh
Description:	Carbon emissions factor of electricity supplied to the project by the palm oil mill in year 'y'
Source of data used:	Higher of the following three sources: 1. Technical specifications on fossil fuel use per energy produced multiplied by IPCC 2006 default emission factor 2. Default IPCC 2006 default emission factor on diesel fuelled stationary combustion applying a conservative generator efficiency of 30% (IPCC chapter 2, page 2.16 ff.) 3. Emission factor listed in Table I.D.1 of the methodology AMS I.D 4. Grid emissions factor relevant to the palm oil mill operation (if grid connection is available) Second source has been identified as most conservative and is therefore applied
Value applied:	To be determined for each CPA

Justification of the choice of data or description of measurement methods and procedures actually applied:	See source of data used
Any comment:	

Data / Parameter:	**$EF_{composting}$**
Data unit:	kg CH_4/ton waste
Description:	Emission factor for composting of organic waste
Source of data used:	IPCC default values
Value applied:	4 kg.CH4/tonne wet waste
Justification of the choice of data or description of measurement methods and procedures actually applied:	The figure was based on wet waste, as per methodology
Any comment:	-

Data / Parameter:	**$UF_{b,baseline}$**
Data unit:	-
Description:	Model correction factor to account for model uncertainties of co-composted wastewater
Source of data used:	AMS III.F version 8 reference: FCCC/SBSTA/2003/10/Add.2, page 25
Value applied:	0.94
Justification of the choice of data or description of measurement methods and procedures actually applied:	As per methodology
Any comment:	-

Data / Parameter:	**$UF_{b,project}$**
Data unit:	-
Description:	Model correction factor to account for model uncertainties of runoff water
Source of data used:	AMS III.F version 8 reference: FCCC/SBSTA/2003/10/Add.2, page 25
Value applied:	1.06
Justification of the choice of data or description of measurement methods and procedures actually applied:	As per methodology
Any comment:	-

Data / Parameter:	**GWP_{CH4}**
Data unit:	tCO_2e/tCH_4
Description:	Global warming potential (GWP) of methane, valid for the relevant commitment period
Source of data used:	Decisions under UNFCCC and the Kyoto Protocol (a value of 21 is to be applied for the first commitment period of the Kyoto Protocol)
Value applied:	21
Justification of the choice of data or description of measurement methods and procedures actually applied:	As required by IPCC.
Any comment:	-

E.7. Application of the monitoring methodology and description of the monitoring plan:

E.7.1. Data and parameters to be monitored by each SSC-CPA:

Data / Parameter:	**Q_y**
Data unit:	t
Description:	Total amount of EFB treated prevented from disposal in year ‘y’
Source of data to be used:	Project owner
Value of data applied for the purpose of calculating expected emission reductions in section B.5	As obtained from actual monitoring
Description of measurement methods and procedures to be applied:	EFB weighing by calibrated weighbridge. Recording frequency: each time a truck passes the weighbridge. The data will be measured and recorded daily in a log sheet and aggregated monthly for calculations
QA/QC procedures to be applied:	Calibration and maintenance are subject to procedures established by instrument manufacturer. The weighbridge will be calibrated annually.
Any comment:	Data monitored and required for verification and issuance will be kept for a minimum of two years after the end of the crediting period or the last issuance of CERs for this programme activity, whichever occurs later.

Data / Parameter:	**$Q_{y,ww,in}$**
Data unit:	m^3 / year
Description:	Flow rate of organic wastewater into the composting facility
Source of data to be used:	Project owner
Value of data applied for the purpose of calculating expected	As obtained from actual monitoring

emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Measurement will be taken from an installed flowmeter that will be placed at the inlet of pond where POME will be pumped to the composting site. Data will be recorded daily in a log sheet and aggregated monthly.
QA/QC procedures to be applied:	Calibration and maintenance are subject to procedures established by instrument manufacturer. The flowmeter will be calibrated annually.
Any comment:	Data monitored and required for verification and issuance will be kept for a minimum of two years after the end of the crediting period or the last issuance of CERs for this programme activity, whichever occurs later.

Data / Parameter:	$COD_{y,ww,untreated}$
Data unit:	t / m^3
Description:	Concentration of organic material in wastewater into the composting facility
Source of data to be used:	Project owner through COD sampling
Value of data applied for the purpose of calculating expected emission reductions in section B.5	As obtained from actual monitoring
Description of measurement methods and procedures to be applied:	COD sampling will be conducted at the inlet to composting site. COD samples will be taken monthly and sent for testing at an independent third party laboratory.
QA/QC procedures to be applied:	Test equipment will be calibrated according to manufacturer's recommendations.
Any comment:	Data monitored and required for verification and issuance will be kept for a minimum of two years after the end of the crediting period or the last issuance of CERs for this programme activity, whichever occurs later. COD values of the wastewater in a mill won't vary over the year as palm oil production process doesn't change. Hence, one COD test a month by an independent third party laboratory is considered as representative and further in line with the government regulation of effluent COD measurement frequency

Data / Parameter:	$Q_{y,ww, runoff}$
Data unit:	m^3
Description:	Volume of runoff water from the co-composting plant
Source of data to be used:	Project owner through a flowmeter
Value of data applied for the purpose of calculating expected emission reductions in section B.5	As obtained from actual monitoring
Description of measurement methods	Measurement will be taken from an installed flowmeter that will be placed at the inlet point to the environmental pond.

and procedures to be applied:	Data will be recorded daily in a log sheet and aggregated monthly.
QA/QC procedures to be applied:	Calibration and maintenance are subject to procedures established by instrument manufacturer. The flowmeter will be calibrated annually.
Any comment:	Data monitored and required for verification and issuance will be kept for a minimum of two years after the end of the crediting period or the last issuance of CERs for this programme activity, whichever occurs later.

Data / Parameter:	**$COD_{y,ww,runoff}$**
Data unit:	t / m^3
Description:	Concentration of organic material in runoff water from the composting facility
Source of data to be used:	Project owner through COD sampling
Value of data applied for the purpose of calculating expected emission reductions in section B.5	As obtained from actual monitoring
Description of measurement methods and procedures to be applied:	Measurement will be taken from the pond where the runoff water is discharged. One COD sample will be taken monthly and sent for testing at an independent third party laboratory.
QA/QC procedures to be applied:	Test equipment will be calibrated according to manufacturer's recommendations.
Any comment:	Data monitored and required for verification and issuance will be kept for a minimum of two years after the end of the crediting period or the last issuance of CERs for this programme activity, whichever occurs later. COD values of the wastewater in a mill won't vary over the year as palm oil production process doesn't change. Hence, one COD test a month by an independent third party laboratory is considered as representative and further in line with the government regulation of effluent COD measurement frequency.

Data / Parameter:	**$Q_{y,comp}$**
Data unit:	t
Description:	Quantity of final compost produced in year 'y'
Source of data to be used:	Project owner
Value of data applied for the purpose of calculating expected emission reductions in section B.5	As obtained from actual monitoring
Description of measurement methods and procedures to be applied:	The produced compost weighing by calibrated weighbridge. Recording frequency: each time a truck passes the weighbridge. The data will be measured and recorded daily in a log sheet but aggregated monthly for calculations
QA/QC procedures to be applied:	Calibration and maintenance are subject to procedures established by instrument manufacturer.

	The weighbridge will be calibrated annually.
Any comment:	Data monitored and required for verification and issuance will be kept for a minimum of two years after the end of the crediting period or the last issuance of CERs for this programme activity, whichever occurs later.

Data / Parameter:	$P_{gen,y}$
Data unit:	MW
Description:	Total capacity of auxiliary equipment installed in the project activity
Source of data to be used:	Project owner
Value of data applied for the purpose of calculating expected emission reductions in section B.5	As obtained from Project Owner (equipment specifications)
Description of measurement methods and procedures to be applied:	Value is based on technical specifications of equipment installed.
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	$OT_{gen\_comp,y}$
Data unit:	hour/year
Description:	Operating hours of composting plant when biomass power plant is out of operation
Source of data to be used:	Project owner
Value of data applied for the purpose of calculating expected emission reductions in section B.5	As obtained from actual monitoring
Description of measurement methods and procedures to be applied:	Data can be obtained from the palm oil mills and composting facilities logbooks. Any time when composting plant is operating during failure of biomass power plant shall be monitored.
QA/QC procedures to be applied:	Each failure or maintenance shut down of either the biomass power plant or composting facility is recorded in company's logbooks.
Any comment:	-

Data / Parameter:	$OT_{machine,skidloader,y}$
Data unit:	hour/year
Description:	Annual operating hours of skidloader machine
Source of data to be used:	Project owner
Value of data applied	As obtained from actual monitoring

for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Data can be obtained from i) Device installed in machine measuring operating hours or ii) The palm oil mills and composting facilities logbooks.
QA/QC procedures to be applied:	Confirmation by supervisor, attendance logbook of machine operator.
Any comment:	-

Data / Parameter:	$\mathbf{OT_{machine,turning,y}}$
Data unit:	hour/year
Description:	Annual operating hours of turning machine
Source of data to be used:	Project owner
Value of data applied for the purpose of calculating expected emission reductions in section B.5	As obtained from actual monitoring
Description of measurement methods and procedures to be applied:	Data can be obtained from i) Device installed in machine measuring operating hours or ii) The palm oil mills and composting facilities logbooks.
QA/QC procedures to be applied:	Confirmation by supervisor, attendance logbook of machine operator.
Any comment:	-

Data / Parameter:	$\mathbf{DAF_{comp}}$
Data unit:	Km/truck
Description:	Average incremental distance for composting transportation
Source of data to be used:	Project owner/compost buyer
Value of data applied for the purpose of calculating expected emission reductions in section B.5	As obtained from actual monitoring
Description of measurement methods and procedures to be applied:	Records of all dispatches of compost from the composting site and the destination for the delivery of compost will be maintained at the plant. For each load/trip of compost taken out of the plant, the operator shall record the distance to destination by speaking to the carrier The total distance will be divided by the total number of trips to calculate the average distance.
QA/QC procedures to be applied:	Confirmation by supervisor & bills/invoices for compost delivery.
Any comment:	Data monitored and required for verification and issuance will be kept for a

	minimum of two years after the end of the crediting period or the last issuance of CERs for this programme activity, whichever occurs later. This will be calculated annually.

Data / Parameter:	**$CT_{y, comp}$**
Data unit:	t/truck
Description:	Average truck capacity for compost transportation
Source of data to be used:	Project owner/compost buyer
Value of data applied for the purpose of calculating expected emission reductions in section B.5	As obtained from actual monitoring
Description of measurement methods and procedures to be applied:	Analysis of the composition of the truck fleet and respective load capacity of each truck will be carried annually by keeping records (log sheets) of the trucks transporting compost that depart from the composting sites.
QA/QC procedures to be applied:	Data from weighbridge or belt scale measurement will be used to cross check the recorded data
Any comment:	Data monitored and required for verification and issuance will be kept for a minimum of two years after the end of the crediting period or the last issuance of CERs for this programme activity, whichever occurs later. This will be calculated annually.

Data / Parameter:	**Oxygen Level in the compost**
Data unit:	%
Description:	Percentage of dissolvent oxygen content in the compost
Source of data to be used:	On-site measurements
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	The oxygen level will be recorded daily using a handheld oxygen meter with lancets of at least 1 m length and sampling with maximum margin of error of 10% at a 95% confidence level. The compost pile will be turned if the oxygen level drops to below 10% to ensure the compost pile is in aerobic condition at all times.
QA/QC procedures to be applied:	The oxygen meter will record data from at least 2 different points in the windrow to ensure homogeneity of reading taken. Average value of these data will be used to determine the oxygen level of the windrow. The handheld oxygen meter will be calibrated annually as per manufacturers specification.
Any comment:	In case oxygen content of the composting process is monitored and above 8%, the parameter $EF_{composting}$ can be set to zero for the portions of Q_y for which the monitored oxygen content of the composting process.

Data / Parameter:	Soil application of the compost in the plantation
Data unit:	N/A
Description:	Proper soil application of the compost to ensure aerobic conditions for further decay
Source of data to be used:	Project owner / plantation [XXX]
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	The sale of compost to smallholders and plantations will be documented through invoices if such exist. In situ verification of the proper soil application of the compost in a representative sample of the sites in the nearby plantations will be performed. Photographic evidences will be provided to demonstrate that the compost is properly applied.
QA/QC procedures to be applied:	All bills/invoices of compost sale will include information about compost end-use destination.
Any comment:	Data monitored and required for verification and issuance will be kept for a minimum of two years after the end of the crediting period or the last issuance of CERs for this programme activity, whichever occurs later.

Data / Parameter:	Quality Control Program to the Composting work
Data unit:	N/A
Description:	monitoring the conditions and procedures that ensure the aerobic condition of the waste during the composting process
Source of data to be used:	Project owner (composting plant team work and Technical Advisor)
Value of data:	N/A
Description of measurement methods and procedures to be applied:	– Turning of the material every 2 days - Regular check of the compost quality leaving the composting facility (i.e. brown color and homogenous shows low C/N ratio: good quality; dark color and heterogeneous shows high C/N ratio: bad quality)
QA/QC procedures to be applied:	- Check of the operating hours of turning machine which equals a defined amount of compost during the period as turning machine operates at fixed speed. - Pictures will be taken of the final compost product on frequent basis. Quality is assured by regular turning anyhow.
Any comment:	-

Data / Parameter:	$MD_{y,reg}$
Data unit:	tonnes of CH_4/ year
Description:	Quantity of methane that would have to be captured and combusted to comply with the prevailing regulations
Source of data to be used:	Current regulations in the Host Country
Value of data applied	0

for the purpose of calculating expected emission reductions in section B.5	
Justification of the choice of data or description of measurement methods and procedures actually applied:	Current regulations in the host country do not require the capture and combustion of methane. Changes in the legislation requirements will be monitored.
QA/QC procedures to be applied:	-
Any comment:	To be updated according to the latest regulation for each CPA. At the date we are submitting this PoA, there are no regulations compelling landfill sites in the host country to capture and combust methane, nor does this take place at the project solid waste disposal site, or other nearby dumpsites.

Data / Parameter:	**f**
Data unit:	%
Description:	Fraction of methane captured at the SWDS and flared, combusted or used in another manner
Source of data to be used:	Data available from palm oil mill site
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Justification of the choice of data or description of measurement methods and procedures actually applied:	No methane is captured and flared at the palm oil mill's facilities. The continuance of no capturing/flaring will be checked on-site during every verification site visit.
QA/QC procedures to be applied:	-
Any comment:	To be carried out on an annual basis.

Parameters to be **calculated** (not measured) :

Data / Parameter:	$BE_{CH4,SWDS,y}$
Data unit:	tCO2/year
Description:	Yearly methane generation potential of the solid waste composted by the project during the years "x" from the beginning of the project activity (x=1) up to the year 'y'
Source of data to be used:	Calculated from other monitored parameters (as explained in section E.6.2, baseline a))
Value of data	To be specified in SSC CPA-DD

Description of measurement methods and procedures to be applied:	Calculated
QA/QC procedures to be applied:	N/A
Any comment:	This parameter is not measured directly.

Data / Parameter:	**$MEP_{y,ww}$**
Data unit:	tCO2/year
Description:	Methane emission potential in the year 'y' of the wastewater co-composted.
Source of data to be used:	Calculated from other monitored parameters (as explained in section E.6.2, baseline b))
Value of data	To be specified in SSC CPA-DD
Description of measurement methods and procedures to be applied:	Calculated
QA/QC procedures to be applied:	N / A
Any comment:	This parameter is not measured directly.

E.7.2. Description of the monitoring plan for a SSC-CPA:

The monitoring plan details the actions necessary to record all the data parameters required by the methodology AMS III.F, version 8, as detailed in section E.7.1 above.

The monitoring plan for this PoA has been developed to ensure that CPAs collect complete data from the very start of their crediting period.

1. Monitoring Plan Objective and Organization
The purpose of the monitoring plan is to measure the emission reductions achieved by each CPA. Details of the CPA monitoring plans will be described in each SSC CPA-DD but shall conform to the following procedures.

2. Monitoring Data and archiving
Data to be monitored is defined in section E.7 and will be recorded at the appropriate frequency. The operator of each composting facility will be responsible for collecting the monitoring data and will provide the coordinating entity with full data records and if applicable calibration certificates. The data will be archived electronically, backed up regularly, and be stored by the coordinating entity for 2 years after the end of the crediting period of each CPA or the last issuance of CERs of this project, whichever occurs last.

3. Quality Assurance and Quality Control
The installation of the monitoring equipment is detailed in each SSC CPA-DD. The CPA entity will implement QA&QC measures to calibrate and guarantee the accuracy of metering and safety of the project operation. The metering devices will be calibrated and inspected properly and periodically as per standard industry norms and requirements.

Procedures to discount conservatively the emission reductions from the projects will be defined, in the event either the project owner or the coordinating entity detects any distortion or mal-function of the monitoring equipment.

The readings from monitoring equipment will be readily accessible for the Designated Operational Entity (DOE) carrying out the verification of monitoring data.

E.8 Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies)

The baseline study was concluded on 12/12/2009. The entity determining the baseline is South Pole Carbon Asset Management, listed in Annex 1 of this document.

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Annex 1

CONTACT INFORMATION ON COORDINATING/MANAGING ENTITY and PARTICIPANTS IN THE PROGRAMME of ACTIVITIES

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

As per A.4.5, the PoA does not receive any public funding. Each CPA will check on public funding individually.

Annex 3

BASELINE INFORMATION

No additional information is needed to explain further the baseline. Each CPA will check the need of such information in the Annex individually.

Annex 4

MONITORING INFORMATION

No additional information is needed to explain further the monitoring section. Each CPA will check the need of such information in the Annex individually.

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